Process and results of analytical framework and typology development for POINT

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Policy use and influence of indicators

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Executive summary

POINT is a project about *how indicators are used in practice*; to what extent and in what way indicators *actually influence, support,* or *hinder* policy and decision making processes, and what could be done to enhance the positive role of indicators in such processes.

The project needs an analytical framework for the subsequent empirical research, lifting off from the initial outline in the POINT proposal, and drawing on existing theories, literature and expert advice. The purpose of this report is to craft such a framework, to describe the logic behind it and the process towards it, and suggest the applications of it.

Key inter-related issues for building the framework, as addressed in this report, include,

- *Terminologies*: How basic terms such as 'use' and 'influence' of 'indicators' and 'framework's are defined and 'typologised'

- *Causalities*: How relationships between policies and indicators can be characterised; how 'influence pathways' for indicators can be depicted; which factors can help explain use and influence (or their absence) along the pathways

- *Theories*: Research fields and theories that can be drawn upon to generate relevant concepts and hypotheses about use and influence of indicators; How insights from different fields, paradigms, and studies can be combined

The report reviews and seeks to synthesize a multitude of approaches and findings in a broad field of literature on use and influence of indicators and related areas.

The resulting framework consists of the structuring of the knowledge, a set of core concepts and associated typologies, a series of analytic schemes proposed, and a number of research propositions and questions for the subsequent empirical work in POINT.

1. Background and purpose of the paper

The purpose of **POINT** is to help understand how indicators are used, and how they become influential – or not - in different manifestations of policy making. The thematic focus is on indicators in support of sustainable development and environmental policy integration, but the aim of POINT is not confined to those empirical areas, it intends to inform the general indicator field.

POINT is not a 'conventional' indicator project in the sense that it does not seek to create or identify sets of recommended indicators - for sustainable development policy or otherwise.
Instead, POINT is a project about *how indicators are used in practice*, to what extent and in what way indicators *actually influence, support,* or *potentially distort* policy and decision-making processes, and what could be done to enhance the positive role of indicators in such processes.

The specific objectives of the project are to:

- "Design a coherent framework of analysis and generate hypotheses on the use and influence of indicators, by pulling together the disparate strands of research and practical experience of indicator use and influence, focusing broadly on European policies, but with a special emphasis on fostering change towards sustainability,

- Test the analytical framework and the hypotheses on specific cases of sector integration and sustainability indicators, as well as composite indicators (indices) in order to:

    - Identify the ways in which indicators influence policy, including the unintended types of influence and situations of 'non-use';

    - Identify factors that condition the way in which indicators influence policies, including the process and the outcome of designing and producing indicators, the type of indicators, expectations of stakeholders involved, the role of the organisations preparing and disseminating the indicators, as well as general socio-cultural and political background factors; and

    - Recommend ways to enhance the role of indicators in supporting policies."

The 'specific cases' of research that have been defined in POINT, include indicators in agricultural, energy and transport policies at the European and national level, as well as indicators for sustainable development strategies, and composite indicators such as the 'Ecological Footprint' and the 'Environmental Sustainability Index (ESI)'.

The three sectors were selected on the assumption that they represent major policy areas at both national and EU levels, which have also received significant attention with regard to indicator systems. Hence they represent areas with a high pretence of 'indicator use'. Meanwhile, sustainability and environmental policy integration are cross cutting, high-profile policy aspirations, which are known to be demanding in terms of their knowledge requirements, and therefore challenging with regard to definition of appropriate indicators for intended 'users'.

The general background for the project is what seems like a widening gap in the field of indicators:

On the one hand increasing efforts are being made to establish indicator systems at all levels of governance from the local to the global, with general aims such as helping to focus attention to salient policy problems, helping to keep track towards fulfilment of formulated goals and targets, enabling evidence-based policy processes, holding public managers accountable for results, and sustaining wider public awareness of important societal issues.

On the other hand there are growing concerns over whether these indicator systems are actually delivering on their promises; if they measure the right things in the right ways; if decision makers are paying sufficient attention to them, and if policies and communities are becoming substantially better informed and managed as a result. There are also 'darker' suspicions about potential manipulative use of indicators, and risks of fostering 'perverse' behaviours among subjects whose performance is being measured.

Nevertheless, there have been relatively few broader studies done so far of how today's indicators are actually being used in policy processes and how governance is being influenced or not by real indicator systems. Helping to fill this gap is the main rationale behind POINT.

An important question in this regard concerns how essentially intangible phenomena such as 'use', and 'influence' of indicators can be meaningfully detected, systematized and studied, in other words how research in this field can be made operational and productive. Published work to date suggests this as a challenging subject with multiple dimensions and several pitfalls, but the literature also points to a rich palette of concepts, approaches and results offered by a variety of scientific disciplines, from measurement theory, to management, to environmental assessment, to political science, and beyond.

Work Package (WP) 2 of POINT has the role of designing a provisional 'analytical framework' for the subsequent empirical research into actual indicator use (first bullet in the purpose of POINT), drawing on available relevant literature.

An initial sketch of the framework was drawn up in the project description (as described in a following section of this report). A mature version with recommendation for future work will be elaborated towards the end of the project. WP 2 is a key in-between step in that process.

The key elements in WP2 are to review and bring together key reported research which can help understand the actual use and policy influence of indicators, to discuss ideas taken from this literature with stakeholders and experts in the indicator field, and to make these insights operational for the subsequent research work within POINT.

The following specific tasks are defined for WP2:
2.1 Literature review and a typology of 'use-influence chains'
2.2 Expert and stakeholder consulting
2.3 Final construction and hypothesis building

This Deliverable reports the work with the tasks, and ends up with conceptual and terminological guidance, and proposed hypotheses for the subsequent empirical research.

The report has the following sections:

- Section 2 introduces the key concerns behind the POINT project, and moves quickly fro the initial framework set up in the proposal to the challenges facing the development of the extended one

- Section 3 describes the two main elements of the WP2 process, the literature review and the consultations with the advisory board

- Section 4 has a focus on the concepts of indicators and frameworks – to distil from literature and analysis what exactly it is we wish to study the use and influence of

- Section 5 provides definitions and typologies for key concepts such as use, influence, impact and pathways

- Section 6 discusses contributions from indicator, policy and evaluation literature to propose factors that may help explain whatever (if any) use and influence take place

- Section 7 summarizes and exemplifies how to apply the suggestions in the report for the POINT work.

2. Introduction – from initial to operational framework

Main issues for the analytical framework of POINT

Members of the POINT team have all previously undertaken research in various fields related to indicators. Some have been involved in actual indicator construction, some have experience from using indicators in assessment or analytic work, others have reviewed indicator systems for policy analysis, while yet others have done research into the policy and decision making fields where indicators are – or are supposed to be – actually applied.

From these different angles most of us have experienced that,

- available indicators are not always effective as measures for the most important questions
- existing suitable indicator systems are often used less, or differently than expected
- the real role of indicators is complex, often indirect, and thus challenging to comprehend

In short, indicators may not always work as they are supposed to in theory, or prescriptions.

Similar observations can be drawn from studies across a range of 'indicator rich' areas such as environmental assessment, urban planning, sustainable development, public health care, and policy performance management: Indicators are increasingly in demand as 'tools' to inform policy analysis and decision making, they are produced and delivered in rising numbers, but their actual use and impact is often limited or unclear (see e.g. Hezri 2006; Rydin 2002; Rosenström 2002, Gudmundsson 2003, Eckerberg & Mineur 2004). Obviously, the 'ideal' functions of indicators are challenged in confrontation with 'real' planning and decision situations.

As noted by Francois Dûchene et al in their study of air pollution indicators in Lyon, France,

> "...decision processes do not simply proceed, in a linear and mechanical way, from measurement to indicators, and from indicators to decision. On the contrary, indicators and monitoring devices, as technical tools, may well be conditioned by social, historical, political, economic or local factors, that could intervene at every level of their production." (Dûchene et al 2002, p 1987)

One plausible assumption could be that so-called 'instrumental use' of indicators (like when an indicator provides the answer to solve a particular policy problem) may not apply in real policy making as often as it is generally assumed. As Innes and Booher squarely put is,

> "...Indicators do not drive policy. People are not suddenly converted because they are confronted with data, no matter how expertly or how collaboratively designed. Compendia of indicators are not used by policy makers as aids to decision" (Innes & Booher 2000).

It seems that the messages carried by indicators can easily be lost in information overflow, trumped by power and vested interests, or simply ignored (Sager & Ravlum 2005; Flyvbjerg 1998).

But the indicators are there, surely, and they are not always left to their own devices. In some cases indicators are seen to exert powerful direct influence on policies and societies at large, exactly due to their image as rigorous, quantified, selective, visible, and targeted, information for

complex decision problems. Just think of policy responses to GDP figures (van den Bergh 2009), stock market indices (Rigobon & Sack 2003); or the OECD PISA reports on educational performance (Rinne et al 2004).

Early research on the role of social science knowledge in policymaking demonstrated that presenting information in the form of social statistics enhances its use (Caplan, 1976). More recent studies have for example revealed a powerful role of performance indicators to steer activities in evaluated organisations, sometimes in unforeseen ways, including also even negative effects such as 'gaming' or 'blame shifting' (de Bruijn 2002; Bevan & Hood 2006; James 2004). Reporting of indicators can surely generate a response, even panic, but not always in the prescribed or most desirable directions.

However, besides or 'underneath' the direct effects of indicators, a wide range of other, more indirect influences are likely to take place. As noted by Judy Innes: "….[W]hen information is most influential, it is also most invisible. That is, it influences most when it is part of policy participants' assumptions and their problem definitions, which they rarely examine" (Innes 1998, p 54). This crucial observation depicts a far more subtle, but not necessarily less important process of indicator influence than both 'instrumental use' and 'panic': Indicators may shape a policy makers 'worldview' in ways which could inadvertently influence future decisions.

Such indirect effects have been studied for some time in the research of policy utilization of evaluations and social science results, where they are known under labels like 'conceptual' or 'enlightening' use of information (Weiss 1999; Amara et al 2004). The attention to these more indirect, subtle and gradually emerging forms of influence from knowledge has also meant that various types of collective and individual *learning* are being recognized as important outcomes from the use of evaluations and assessments in policymaking (see e.g. Baron 1999, 62-65; Van der Knaap, 1995; Balthasar and Rieder, 2000). Clearly, to the extent that 'learning' would overtake 'instrumental problem solving' as a significant role for indicators, a revised standard than the instrumental one would have to be used to detect and assess their use and influence.

However, from the point of view of indicator 'constructors' and 'funders' the latter view may appear somewhat incomplete. The intention on their part is to ensure a strong match between the information provision and the policy needs in order to allow timely and appropriate decision-support, and 'evidence-based' policy making. 'Enlightenment' and 'learning' uses of indicators alone are not enough to serve critical indicator functions in policy such as performance assessment or accountability. Moreover, the provision of sophisticated and costly indicator programs may be difficult to justify if no 'instrumental use' can be demonstrated, and all that remains are 'enlightenment' effects, which is only hoped for and not documented. In short, ways to reveal and evaluate also the influence and importance of any more indirect, subtle and unintended effects of indicators are highly relevant.

Whatever role indicators are intended for, a clear and detailed understanding of their actual impacts, and how they come about, seems necessary to ensure that best use is made of them.
In short, how could one 'improve' indicators if it is not clear how they work, who actually uses them, in what way, under which circumstances – and to what effects, now and in the longer term?

This is what POINT sets out to explore.

We can now define three sets of questions for this mission, concerning a) the overall problem to be addressed, b) the input from existing research, and c) the practical focus.

First, as regards *the overall problem*, four interrelated concerns stand out namely,

- *under which circumstances* indicators are actually being used in policy making,
- *how* they are being used,
- how their *influence* is conditioned by qualities of the indicators themselves, the channels through which they flow, or the context of their application; and ,
- under which circumstances efforts to *increase* indicator influence will reinforce problem control, conceptual learning, or strategic behaviour.

Hence, we are concerned with expected as well as unexpected effects of indicators, and positive, as well as potential negative ones.

Secondly, as regards *previous research and existing knowledge* it seems possible to learn from, and combine insights from a range of fields and paradigms that can inspire the somewhat 'under researched' area of indicator use. The following questions to existing research appear especially important concerns for the work in POINT:

- How can research looking at direct instrumental functions of knowledge and indicators be combined with research on indirect, communicative or learning types of effects, a need that has been raised by several authors (e.g. Owens et al., 2004; Van der Knaap, 2006; e.g. Bristow et al., 2009)? How far can insights and results be mixed across those paradigmatic boundaries?

- To what extent can concepts like 'instrumental'/ 'enlightenment' use, and 'learning' be imported to the indicator area from the broader knowledge utilization literature, as suggested by e.g. Hezri and Hasan (2004) and Gudmundsson (2003)? Does 'use' for example mean the same thing for indicators as for evaluations, and can it be detected with the same methods?

- How to cope with the wider policy contexts in which indicators assert their influence? How can insights from policy sciences be drawn into indicator research, without drowning the indicators in a host of other potentially more important forces (James & Jorgensen 2009)? On the other hand, how can research zoom in on the role of indicators in policy processes without falling victim to an 'indicator fetishism' (see e.g. Gray 1997 for a similar concern)?

Such questions are particularly relevant for POINT, given the commitment to conduct empirical research on indicator influence. However, it is clearly not trivial to bring theoretical knowledge from past research and literature to bear on indicator practice, considering the elusiveness of 'knowledge use' and the multitude of dimensions and theoretical perspectives offered. We will use the following three questions as more operational ones to structure the subsequent approach:

- How should we *define and describe* the 'actual' use and influence relations for indicators with appropriate concepts and terminology, and how to identify them in empirical research?

- How could we *characterise and explain* the use and influence relations we identify, using appropriate groups of causal factors and explanatory mechanisms?

- How can we *delimit the scope* of this inquiry to what is manageable for empirical research in POINT and formulate relevant and researchable hypotheses and research questions?

We continue this process now by revisiting the initial framework as defined in the POINT proposal.

Starting point: The initial framework

A starting point for developing the analytical approach of POINT is taken in the initial simplified 'mock-up' model established in the project description, see Figure 1. The simple model represents our initial summary of some insights from various studies of on knowledge and indicator use – mainly evaluation research, assessment and planning studies.

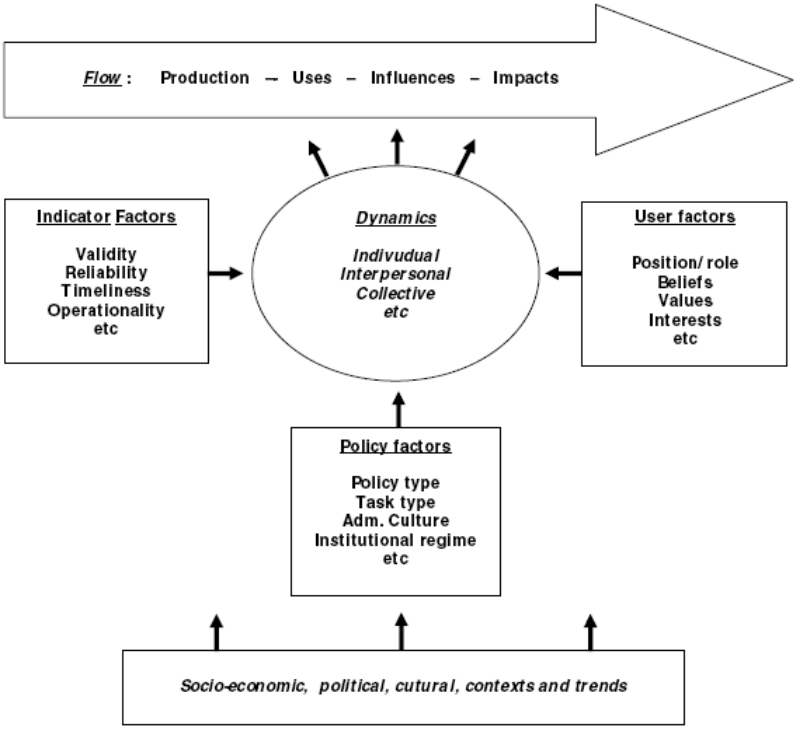

Figure 1 Initial framework from POINT project description

The model has the following key elements:

The top bar loosely illustrates an idealized flow or 'pathway' for how an indicator (or indicator system) informs a policy process. The indicator is conceived, and produced, then transmitted to the policy process, where it is perceived and then used; becoming influential in a process, leading to effects on a decision, its implementation and its final outcome, with some possible further (perhaps unintended) impacts on the wider scene. The indicator is 'at work', making its marks.

Obviously, actual indicator pathways can be interrupted at any point in time, transmission not leading to perception, use not leading to influence, etc. Moreover a real process cannot be assumed as linear or unidirectional in this way, since indicators would often be commissioned from policy needs initially, and various kinds of feedback would apply, like for example political requests for revised indicator design, data verification, or reporting frequencies. As already discussed, there can also be many different kinds of 'use', from instrumental to learning, and hence many parallel or diverging 'pathways' with different attributes. The pathway concept aims to broadly illustrate a hierarchy of stages an indicator may go through, each one roughly representing a group of possible *dependent variables* for the research on indicator use and influence.

The three square boxes below represent domains of possible 'influencing factors' that can be assumed to drive, constrain, or put their mark on these pathways. The domains could thus illustrate groups of *potential independent variables* if the context is an explanatory model: What can contribute to explain the way and the degree to which an indicator is used or not used? The three domains themselves have been defined on pragmatic grounds and should also be considered tentative.

The first domain is called the *'indicator factors'*. These have to do with indicators considered as instruments of technical representation and control. Indicator factors include characteristics of the information such as relevance, comprehensibility (accessible language), timeliness, comprehensiveness (all important issues covered), coherence, appropriateness analytic methods, and concreteness of policy recommendations. (Vedung, 1991; Van der Meer, 1999; Weiss, 1999, 479; Eckley, 2001). In some cases 'indicator factors' seem to be considered the *only* important ones for its use: if the indicator is correct in a computational sense and presented correctly then it will be 'used' more (or, 'what gets measured, gets done' as a popular saying goes). As we have already noted, even 'perfect' measures could provoke completely different reactions or 'uses'.

The second domain is called *'user factors'*. This refers to the people involved in policy processes, and how they are inclined to call for, respond to or apply indicators in particular situations. This could again depend on a host of elements such as the users' backgrounds, positions, group affiliations' and motivations. For example, some administrators may have statistical training which makes them more ready to apply certain indicators; other participants may mistrust certain information sources because it conflicts with their pre-given worldviews; others again may learn by shifting positions. The 'users' of indicators typically operate in a complex and nuanced environment. An indicator, no matter how well crafted and presented, will be just one element in a maelstrom of calls for attention, and users may be differently inclined in this respect.

The third domain is labelled *'policy factors'*. This refers to the types of policy domain and policy task the indicators are supposed to inform (e.g. in terms of what level of complexity or controversy is involved; Hoppe 2005), in particular also the *institutional frameworks* in which the users apply the indicators. Institutional frameworks consist of formal and informal rules and procedures that govern the processes, and the roles of different types of information in a given situation. For example, there may be legal requirements to apply a certain indicator to benchmark an organisation against a target, whereas informal codes of conduct may delegitimize this information in favour of other concerns in a later step in the process. Differences in legal and administrative cultures among policy sectors or between institutional arrangements in different countries are among the potential 'policy factors' (Pollitt 2005).

The centre circle illustrates that factors in all domains may be brought into play on the indicator use-influence pathways, one by one or together. It is thereby assumed that contributing factors need to be activated to drive or change the use-influence pathways, by some sort of 'mechanisms' or 'dynamics'. These could be assumed from general social, economic, psychological, political, etc theories (suggesting 'driving forces' such as self-interest, instrumentalism, mimesis, learning, power, and so on), or derived from more specific explanatory set-ups applied in related research areas, such as knowledge utilization org or evaluation studies. Numerous assumptions could be made about the nature of the dynamics, but none have explicitly been prescribed by (or for) POINT in advance.

Finally a set of 'underlying' socio-economic *trends or drivers* are vaguely hinted at in the model. Examples as initially envisaged include factors such as business cycles, management reforms, technological advances, or external shocks (like crisis, attacks, disasters or significant accidents).

How to develop the framework?

As already noted, there is room for multiple dimensions in this approach as initially sketched. Different transmission mechanisms, and 'show stoppers' can be considered for the pathways; different domains and categories can be assumed for the causal factors; different mechanisms and dynamics can be assumed to operate among the factors, etc.

To make the model operational for empirical research it must be refined along these dimensions with identification of key variables, assumptions, and research questions that could be tested. Developing the approach should be informed by consulting past research and knowledge, aligning it with the purpose and targets of the POINT work, seeking advice from experts and peers, and delimiting the scope of the operation to manageable proportions.

A useful way to characterise the ambitions of POINT in this regard is Elinor Ostrom's typology of research approaches, where she distinguishes between *frameworks*, *theories* and *models* (here cited from Sabatier 1999)

> "*Frameworks* organize diagnostic and prescriptive inquiry (…) They provide the most general list of variables… Frameworks provide meta-theoretical language that can be used to compare theories" (Ostrom 1999 p 39-40). It can provide"…anything from a skeletal set of variables…to something as extensive as a paradigm" (Sabatier 1999, p 262)
>
> "A *Theory* provides a 'denser' and more logically coherent set of relationships" (Sabatier 1999, p 6). Theories "…make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its process and predict outcomes. Several theories are usually compatible with any framework" (Ostrom 1999, p 40)
>
> "*Models* make precise assumptions about a limited set of parameters and variables" (Ostrom 1999, p 40). It is a "…representation of a specific situation." (Sabatier 1999, p 5). They "…allow analysts to test specific parts of theories" (Schlager 1999, p 255)

At this stage POINT stands as a very open 'framework' in the above sense. A general ambition of the project is to develop and enhance this framework throughout the project, but not seek to confirm or establish a single 'theory' to explain the use and influence of indicators, nor to develop an exact 'model' with a limited number of variables to predict their effects. We see the main justification of the project as to broaden, deepen and connect current understandings in the field of indicator influence, where 'simplistic' assumptions of several specific theories may have to be challenged or combined. The framework should mainly provide the 'meta-theoretical' language, and the 'general lists of variables' mentioned by Ostrom, which will allow parallel theories to be applied and possibly compared.

The main research instruments that POINT will use are,

a) further conceptual development of the framework backed by a literature review in order to specify a number of variables, assumptions and hypothesis to guide the subsequent empirical research (this work package),

b) empirical research and analysis into a set of distinct contexts and cases (sectors-countries-indicators) in the following work packages. The methods applied in this latter process are mostly of an interpretative kind, and include:

- Document analysis (policy documents, indicator reports, meeting minutes etc)
- Face-to-face semi-structured interviews with indicator users and developers
- Possibly surveys among user groups
- Interactive workshops with indicator users and stakeholders

c) throughout and towards the end of the project revisiting the conceptual framework hopefully leading to some theoretical developments and contributions, and a more fully developed framework to emerge at the closure of POINT (WP 7).

The intended research set-up in the b) phase is not directly comparative in the sense of comparing across a set of very similar policy cases. The policy areas and associated indicator systems are considered too diverse for such a design, and the intent is rather to enable a better understanding of how similar items (namely indicators, and indicator sets) may produce different outcomes in different contexts, as we suspect they do.

Nevertheless, cross cutting discussions of results and possible generalisations will be greatly facilitated by adopting a common 'meta-theoretical' language with shared sets of variables applicable across the range of empirical domains, sectors, levels and methodologies.

The next step has been to consult the literature in order to move the initial framework towards a more mature and operational research stage in these respects

3. The process

Conducting the literature review

The topic of POINT cuts across many fields of research, and the scientific material that could inform the development of the analytical framework and the subsequent research is very broad indeed, covering in fact several inter-locking 'literatures'.

Three key questions must be considered with regard to the literature; first, *what* do we want from the literature, secondly *which literatures* to consult, and thirdly *how* to convey and present the results of the literature review?

Concerning the *first* question the analysis above implies a focus on the following two issues:

- how can literature inform about concepts for indicator 'use' and 'influence'? How are these defined, and how are 'use and influence pathways' described in the literatures?

- what does the literature suggest to 'explain' use and influence? Which are operational formulations for elements such as 'indicator factors, 'user factors' and 'policy factors', and associated dynamics?

Concerning the *second* question about *which* literature, we have expanded the original literature base informing the POINT application, during the first months of POINT through an extensive open process of search and review conducted by four members of the POINT team.

The search has included literature broadly theorizing the potential policy roles of 'knowledge', literature zooming in on the particular functionalities of indicators in this respect, and not least empirical studies of actual knowledge and indicator use in various domains.

The search has used standard electronic search facilities, such as electronic library databases, journal websites, and academic search engines (including Google Scholar, SCIRUS, Ingenta, Web of Science, Informaworld, EBScoHost, ScienceDirect and others) to identify potentially relevant references. Search phrases have included numerous variations combining terms like "use", "utilization", "influence", with "indicators", "indices", "performance measures", and "knowledge"; "evaluation"; "evidence", "evidence-based policy" etc. .

Other sources of information include our own previously collected material in areas such as evaluation studies and indicator practice, using 'citation snowballing' from this material to further references; consultation of websites of major related EU research projects and programs such as SEAMLESS, SENSOR, Sustainability A-Test, SKEP ERANET, and REFIT; participation in various workshops and conferences, and links provided by colleagues and experts including members of POINT advisory board.

The references identified have first been listed with bibliographical information including abstracts in a document named "Cumulative literature record" with now around 230 entries. The record contains (with few exceptions) only peer reviewed scientific articles, while books as well as reports, conference presentations, 'working papers', and other grey literature is registered other collections. The record is grouped in the following categories of literature:

1. Knowledge use in policy generally
2. Evaluation use
3. Performance information use
4. Knowledge use in sust/env area (NOT indicators)
5. Indicator use
6. Indicator terminology and guidance GENERAL
7. Indicator terminology and guidance PERFORMANCE MANAGEMENT
8. Indicator terminology and guidance SUSTAINABILITY/ ENVIRONMENT
9. Indicator Terminology and Guidance - AGRICULTURE
10. Indicator Terminology and Guidance – ENERGY
11. Indicator Terminology and Guidance - TRANSPORT

As can be seen, an attempt is made to distinguish references explicitly dealing with 'use/influence' of knowledge etc (groups 1-5) from more general 'indicator terminology and guidance' references (groups 6-11). The latter include publications about indicators that do not address actual use or influence (but instead define indicators, typologise indicators, apply indicators etc). The first group is divided into literature sharp on *indicator* use (part 5) vis a vis *other* types of information use (1-4). The latter group into general, sustainability and sector indicator applications. In practice several references overlap two or more of these groups, but they are only listed once each in the record.

A number of particularly relevant references, especially from groups 1-5 have been selected for more detailed review by members of the POINT team using a form specifically designed to identify and characterise content of relevance for the POINT framework.

The form includes the following entries:
1. Reference(short name)
2. Bibliographical data
3. Field of research
4. Scope of research
5. Key messages
6. Contributes to understand/supports hypothesis for:
    - Knowledge use-influence flows
    - Indicator factors
    - Policy factors
    - User factors
    - Dynamics
7. Implications for/contributions to the draft framework (interpretations)
8. Does not contribute to/misses/weak points
9. Others who refer to this source
10. More detailed observations, significant quotes etc

Several of those selected references (but also some others) are drawn upon in the parts that follow below.

Concerning the *third* question above, about presenting the results of the review, we will first proceed now with a short general overview of relevant literatures as identified from the search, and then continue to review more in depth a number of key references up against the initial framework, in two steps; Chapter 6 consider definitions and pathways of indicator use and influence, while chapter 7 addresses causes and explanation factors.

Overview of the literature

The 'epistemological reach' of POINT concerns broadly how various forms of knowledge is apprehended and utilised in a number of societal domains and processes with particular emphasis on use of practicable indicators and the policy domains. This reach encompasses a number of research fields, in which those topics are addressed with various degrees of concreteness.

At the most general level, there are major *philosophical literatures* dealing with the role of reason, rationality and 'evidence' in societal and political dealings. Different schools of thought exist which assume or seek overall rational principles and models for the public order, versus schools that are more critical to this idea, or argue for the existence of conflicting or contextual rationalities in policymaking (ref. e. g. Habermas 1984; March & Olsen 1995; Elster 1986). General paradigmatic views on 'rationality' often imply particular ideas also about the role of 'knowledge types' like science pr indicators for policy (Rydin 2007; Parsons 2002; Mayer 2004). Some of this literature is as old as philosophical inquiry itself, while some is part of contemporary philosophy of science debates (Nowotny 2003; Flyvbjerg 2001). POINT will not explore general literature of philosophies of policy or science, but some of the overall issues will be addressed.

More operational for POINT are the bodies of literature, which over the last 30 years or so have specifically studied the *use, utilization, non-use, or influence* of various knowledge types in politics, policy, administration, government, governance, etc.(Caplan 1976; Barker & Peters 1993; Sabatier 1999; Rich 1997; Innes 1990; Schön & Rein 1994; Hoppe 2005). Much of the work has been driven by concern with observed limitations to how information is supplied to and adopted in actual policy making. The use of *scientific research* results, and (more recently) *'evidence'* in policy making are significant fields within this general area (Nutley et al 2003; Sanderson 2004; Weiss & Bucuvalas 1980), while the use of *evaluations* has been another important research area (Weiss 1998; 1987; Mark & Henry 2003; Shulha et al 1997). These bodies of literature, which are partly overlapping, together form a rich source of terminology that can inform research about use-influence pathway concepts also for indicators. General overviews and annotated bibliographies of this literature are provided by e.g. Boas et al (2008) de Vibe et al (2002), Neilson (2001); and Romsdahl (2005).

However this field is also very diverse, and still developing. Many references are more philosophical than empirical; some are critical, others more prescriptive; some are founded on theories about policy or decision making processes in general, where 'knowledge' comprise only one minor part (e.g. Sabatier 1999; Bovens et al 2001); others zoom in much closer on the use or influence of particular knowledge technologies themselves, as for example in the evaluation research of Forss et al (2007), Marra 2004, Preskill 1997, or Weiss (1998). The advantage of a 'technology-near' approach is to be able to see and distinguish details of the knowledge use (O'Donnell & David 2000); the risk is on the other hand to overstate the importance of knowledge, indicators, etc for policy, compared with other factors (e.g. power, economics). For practical reason we have skipped most of the general policy and decision making literature, in favour of works that give more specific attention to the role of knowledge or particular 'knowledge technologies'.

The '*use of indicators*' as such is of course an essential, but minor research field by itself (with notable contributions such as Innes 1990; 1998; Rydin 2007a; 2007b; 2003; Hezri 2004; Hezri and Dover 2006; Hezri and Hasan 2004). To a wide extent work in this field builds on the above mentioned areas of study. 'Indicator use' is also featured in studies of public administration where 'performance indicators' constitute significant parts of the tool box (e.g. Pollitt 2006; van der

Knaap; Feller 2002; Carter et al 1993); the same is the case with the closely related area of organization and management studies (e.g. Kennerley & Neely 2003; Olsthoorn et al 2001; Nonaka 1994; Franceschini et al 2008). The literature on organization and performance measurement is particularly relevant because it zooms in on connections between indicator based measurement and policy processes. Yet another indicator-use-related research area include the role of knowledge in *environmental and sustainability assessments* that have emerged as a major policy field during the last two decades (Cash et al 2002; Lehtonen 2006; Deelstra et al 2003, Herrick 2000). All of these literatures – administration, organization, assessment - contain important references for POINT, addressing how the uptake and use of information may be framed by specific characteristics of policy functions, assessment tasks, or knowledge regimes involved.

A much larger literature on indicators than the 'use of indicators' segments of course exists, in the form of numerous indicator publication across more or less every sector and policy field over the last decades (including 6-11 in our literature groups above). The boundaries around this literature are hard to draw, and its relevance here in the 'conceptual framework' part of the work is less evident to the extent that it *assumes* or *prescribes* certain indicator uses for policy rather than study them explicitly. However, key important contributions of this literature include definitions and typologies of *indicators types, quality criteria* and *frameworks* that will be needed to characterise both 'indicator pathways', and 'indicator factors' of our study. Examples of basic terminology are found in OECD (2003), EEA (1999), Boyle et al (2001); Franceschini et al (2008) Kusek & Rist (1994), Eyles & Furgal (2000), Adcock and Collier (2001) and others. More specific terminology for each area of enquiry in WP3-6 can be added in the relevant WPs.

Further areas of relevant literature include information and communication theories, media research, Decision Support Systems analysis, and even cognitive psychology etc. Those fields of research all contain work that contributes to theorize and operationalise various aspects of information handling and transmission. However, we will rely mostly on how such aspects have been incorporated in some of the broader knowledge and indicator use literature already referred to (e.g. works by Rich (1997), Henry & Mark (2003), Innes (1990) O'Donnell & David (2000) and Hezri (2004)). More in depth explorations could be considered for a later phase of POINT.

Table 1 illustrates how some key references contribute to the analytical framework.

Table 1 Examples of key reference types and their contributions to POINT WP2

Fields	**Example references**	**Contributes to**
Knowledge use literature generally		
Policy use of evaluation, research and knowledge	Amara et al (2004); Hisschemöller & Midden (1999); Innes (2002), Landry et al 2001; Rich & Oh (2000); Henry & Mark (2003) Weiss (1979)	Use-influence pathways User factors, policy factors
Administration and organization	Brignall & Modell (2000); Pollitt (2006, 2005); Feller (2002) Julnes & Holzer (2001); Van der Knaap (2006); Halachmi (2002); de Bruijn (2002)	Policy factors, user factors
Environmental/sustainability assessment use	Cash et al (2002); Farrell et al (2001); Niemeijer (2002)	Indicator, user and policy factors
Indicator literature		
Indicator use	Innes 1998, 1990; Hezri (2005); Hezri (2004; Hezri& Dovers (2006); Rosenström (2002); Rydin (2007)	Use-influence pathways All factors, in particular 'indicator factors'
Indicator terminology and guidance (not use)	OECD 2003; EEA 1999; Niemeijer & de Groot 2008; Franceschini et al 2008; Jackson et al 2000; NCHOD 2006; Gallopin 1996; 1997	Indicator typologies

Figure 2 attempts to illustrate broadly how various strains of research connect and inform the study area 'indicator use and influence'.

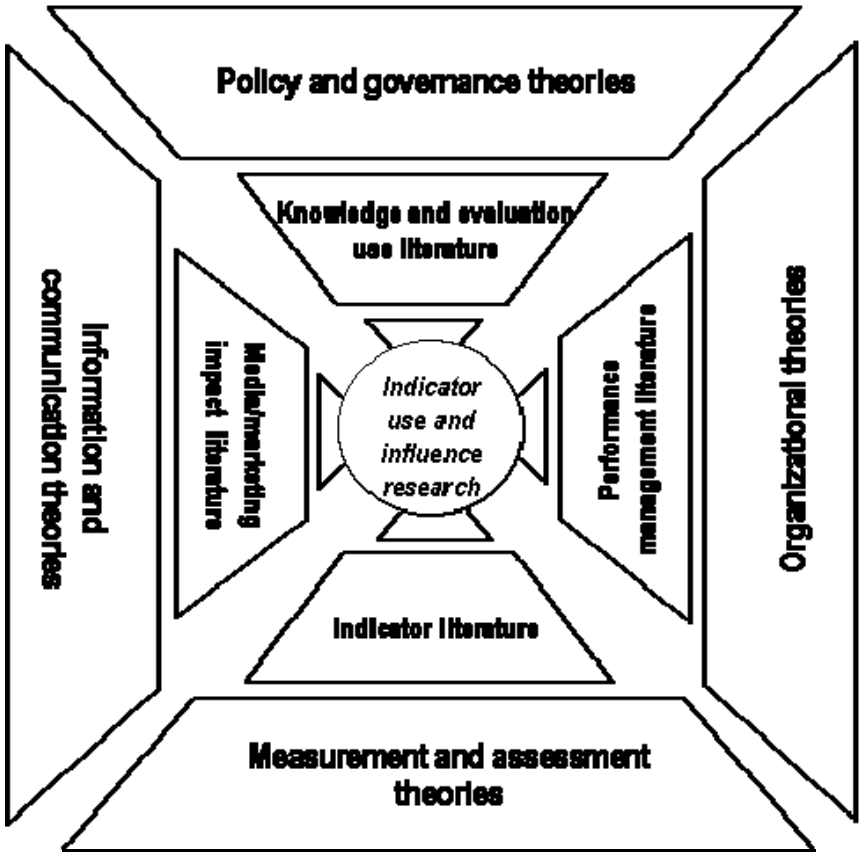

Figure 2. Research fields informing the study of indicator use and influence.

We can note that we have found rewarding contributions to conceptualize indicator terminology and pathways particularly in the 'north', 'east', and 'south' part of the 'inner' set of literatures, while inspiration to consider explanatory causalities etc can be found throughout the whole landscape. The suggested connections are obviously not always as smooth as indicated in the figure. For example James and Jorgensen (2009) note an unfortunate divide between general theories of policy change and the 'knowledge utilization' literature, which means that the former tends to be too insensitive to actual policy effects of information.

In practice the theories and literatures often overlap or connect two or more of these groups, and the distinctions suggested are pragmatic and somewhat arbitrary. The overlaps are not always a disadvantage, however, to the extent they can contribute to an integrated understanding.

Consultation with the Advisory Panel

On November 20 2008, a consultation was held with the Advisory Panel of the POINT project.

The purpose was to discuss the initial framework, the first steps taken to develop it, and the further work needed to complete it. A working paper with status of the work had been submitted in advance to the panel, and a slide presentation was made highlighting questions for the project as such and for the more immediate setting-up of a working framework for the empirical research.

In addition to tables and questions as included in the previous sections of the present report a first set of proposed key glossary terms for POINT was presented, and a first draft scheme called 'Preliminary terminology for Indicator policy 'functionalities' was discussed (see **Table 2**).

Table 2 Preliminary terminology for Indicator policy 'functionalities'
Note 1: No particular logic concerning horizontal linkages were assumed in advance
Note 2: 'PPP' = 'Policy', 'Program', 'Plan'

Type	**Application**	**Use**	**Operation**	**Influence**	**Impact**	**Role**
Categories	Policy initiation Policy design Policy monitoring Policy evaluation General debating	Request/search Read/hear/note Reflect in mind Apply in text/ calculation Mention in internal talk Show in speech/ppt Apply in official document Forward to others	Perception Transmission Persuasion Justification Tactics Community building	Reach /support decision Change next part of PPP	Change the process Change Organization Change Internal ideas Inform external debates Revise indicator	Instrumental Conceptual Symbolic Processual Political None
Explanations	'Application' is the official function area or process step of the indicator . The categories (initiation, design..) are classical steps in a policy cycle where indicators may be applied. The fifth type allows to consider more unspecific cases policy-wise	'Use' This category is to directly assist in empirical work (interviews etc) We ask about what a person (or institution) did with an indicator (or indicator report) when or before they received it. More categories possible	'Operation' The category allows to interpret and categorise the uses according to analysis of the operations, (possibly already partly during the interview) 'Perception' is internal (in mind) 'Transmission' is to send on with no active use, etc	'Influence' This category should allow to identify how the application, operation and use lead to influence, through interview and document analysis. Much more detail needed	'Impact' This category should allow identifying how the application, operation and use lead to impact, through interview and document analysis. Multiple influences possible	'Role' Final interpretation of the role of the indicators. Categories correspond more or less to classical 'use' functions in the evaluation literature. Multiple roles are possible.

The advisory Panel were represented by the following experts:

- Louise Rickardt, Lone Pine coaching
- Bernt Röndell, European Environment Agency
- Christopher Pollitt, Katholieke Universiteit Leuven
- Nancy Holman, London School of Economics
- Kate Scrivens, OECD
- Ulla Rosenström, Prime Minister's Office, Finland
- Graham Locke, EUROSTAT

In general the panel welcomed the POINT project and its aspiration as described in the working paper and presentations. The tentative terminology suggested in **Table 2** was discussed but not considered in detail as a whole. A number of comments were given to various aspects of the preliminary framework, and the further work. It was recognized by the panel that the remarks would not necessarily add up to uniform clear directions. POINT was advised to use own judgment in terms of making the best use of the contributions.

The following summarizes the main comments made:

Regarding general framework, concepts and definitions:

- The whole set-up may be too complex for the further work; it is advisable to consider, for example, if a micro or a macro focus on the indicator/policy interaction level should be addressed. It is easier to find 'evidence' and patterns with fewer factors to consider.

- There are differences in use of data, indicator, representation, interpretation; this should be spelt out more clearly.

- The initiation phase of indicators construction should be addressed more (Scientists with a good idea, statistics offices ,etc); look at the fact that indicators might be more or less conceptually-driven, or data-driven, or stakeholder-driven; for example under' symbolic use', 'symbolic generation' of indicators should considered.

- There is a need for clear definitions of composites and aggregates. Composites should not be considered as 'simplified' indicators. It may matter more who issued it, rather than its technical performance

- It is often not possible to have a stable set of indicators over long time.

- An important form of use is to catch attention, leading to asking for more information.

- Leakage to media could be considered as an 'influence chain'

Regarding influence factors and explanations:

- The draft does not address sufficiently the level of 'indicator factors' for explanation of use/influence.

- Links between indicators and incentives are important (e.g. hospital ranking and executive directors being subject to be fired in case of bad scores => huge interest in indicators).

- Indicators may need to be 'hot' to increase some aspects of use, but they can also be 'too hot', meaning raising controversy, and therefore being avoided.

- The spatial dimension is missing among the 'indicator factors', local constituencies influence use. To study indicator influence, understand the playing field of your indicator, i.e. map the actors, policy issues and so forth before exploring the indicators effects.

- Indicators raising versus answering questions; these aspects concern different fora; indicators are not *necessarily* meant to measure an issue, but to create an understanding

- Wrong timing can induce non- intended or non use.

- Consider the broader stakeholder groups and more indirect effects of indicator use.

- 'Repackaging' of information can increase the influence (example: private organization changing the display of originally public hospital rankings)

- Recognize there is different thinking in different policy areas/institutions; the policy culture within a field is important

Regarding methodology and approaches:

- There should be more focus on research methods and how to apply them.

- It might help to investigate only policies with a clear policy, where indicators have already been used in an implementation phase; otherwise use or influence will be even harder to detect.

- Interviews may not be the best method, e.g. for high level policy makers, perhaps observing them for a week instead could be useful.

The POINT consortium highly appreciate the comments and have made efforts to accommodate most of them. In the following sections 7 and 8 we proceed with developing the building blocks of the analytical framework, drawing from the literature as well as the comments and suggestions given by the advisory board. As will be seen, the schematic and preliminary terminology suggested in **Table 2** will be further substantially revised.

However, as a general remark it has been decided to maintain a broad outlook for the development of the framework rather than narrowing it down further to e.g. a particular paradigm, a certain level of analysis or a certain stage in the implementation of policy. Even if particular sectors, polices and indicator example case are selected for analysis in POINT it is difficult to see how to specify in advance of the literature review which contributions are likely to yield the most fruitful inspiration to develop and apply the interdisciplinary notion of 'influence pathways'. The possibility to narrow the framework down to certain pathways, levels, or points of influence will rather be an issue for the summary work to be conducted in WP7.

A second remark is that we will not use this paper to explore or develop specific research methodology, but will keep to the level of an analytical 'framework', setting up 'meta-theoretical' language, 'general lists' or typologies of variables etc, and general hypotheses to be refined and applied in the subsequent work packages.

4. Indicators and Frameworks

Overview of sections 4, 5 ,6

The input received from literature and consultations allows us to expand and deepen the notions of indicators, use, influence and associated pathways, in *three main steps*.

The *first* step concerns understanding the 'subjects' of possible use, influence and impact, namely the indicators themselves and their functionalities We will in this section develop a *definition* which is appropriate for the research of the POINT project, and then seek to devise typologies that can be used in descriptions and analyses. A main concern is to distinguish exactly what is being used, when we talk about 'indicator use', and to clarify implications of the existence of different *types* of indicators. Another effort is to review the notion of indicators *frameworks*, what role they play and how they can be analyzed in terms of use and influence. The view in this section is predominantly instrumental, with its emphasis on clarifying some basic 'mechanics' of indicators as a 'knowledge technology' for policy.

The *second* step that is addressed in the following section 5 expands on notion of policy use, influence, impacts and the pathways connecting them. A wide variety of ideas can be found in the literature relating these concepts to one another logically, theoretically or empirically. Indicators themselves can for example be followed through stages such as conception, production, application, and revision (Keeble et al 2002; MacLaren 1996), and be divided into for example 'data-driven', versus 'theory-driven' processes (Niemeijer 2002). Another kind of 'pathway' follows the policy side, seeing indicator use determined by the logic of policy stages like 'agenda setting', 'selection of alternatives' and ' implementation' (Ilner 1984). Scholars such as Sabatier (1987); Henry & Mark (2003) and Hezri (2004; 2005) have been developed more elaborate notions of *interactions* between the two sides, which Brennin (2007) illustrates simply in Figure 3. While there is not much firm knowledge about such pathways, inspiration to *envisage* various relations and suggest propositions for the research can certainly be found.

The *third* step in section 6 addresses literature providing theoretical building blocks and operational factors to understand the why's of indicator used and influence, and hence to add further propositions of where to look for evidence and indications of influence.

Indicators

There is a considerable literature about *indicators*, where many definitions are proposed (Moldan et al 2005, Hammond et al 1995; Morse 2004; OECD 2003; Franceschini et al 2008; Gallopin 1997; 1996; Bauler 2004).

Even if POINT will mainly study notions that are already commonly recognized as 'indicators' within sectors or policy fields, an indicator definition is nevertheless needed to specify the 'object' of use and influence, that is, *which more specific characteristics to look for the use and influence of when we speak about indicators*, and how to distinguish this 'object' from the use and influence of *other types of information* (such as statistics, evaluations, models etc).

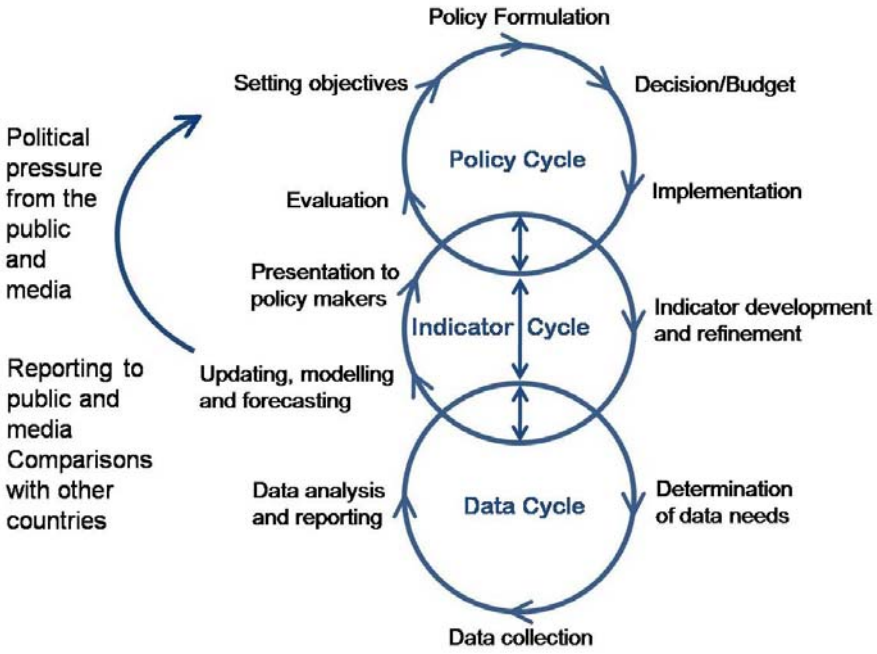

Figure 3 Assuming interchanging 'pathways' of indicators and policy (Brennin 2007)

A suitable definition of indicators for POINT has to be broadly meaningful across several sectors and stages of policy making to be dealt with, and across the natural and social science fields. It should also be open to potential generalization to other empirical areas than the ones we study (environment, sustainability etc).

Many indicator definitions are in fact quite specific to a field such as the following,

> "A substance (as litmus) used to show visually (as by change of colour) the condition of a solution with respect to the presence of a particular material (as a free acid or alkali) (Webster's Dictionary)"
>
> "An organism that can be used to determine the concentration of a chemical in the environment. (McGraw-Hill Encyclopedia of Science & Technology)
>
> "A numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment." (US EPA 2006)

Franceschini and colleagues of Politecnico Torino seek to develop a general, consistent indicator phenomenology based in formal representation theory (Franceschini et al 2008; 2006; Cecconi et al 2007). A key notion is that indicators are devices that symbolically represent empirical as well as non-empirical phenomena, called '*representation targets*'. 'Representation targets' can be systems, or organizations, or other entities of interest.

Indicators are thus defined as…"an application that – according to the representation-target – homomorphically maps the empirical manifestations into corresponding symbolic manifestations." (Franceschini et al 2008, p. 138) 'Homomorphically' means that the symbol emulates the structure of the empirical phenomenon faithfully. Ideally representations should be complete with regard to all dimensions of the measured phenomenon, and non-redundant. However, in general indicators *do not* establish unique representations (Francheschini et al 2006). This means that several indicators may be needed (e.g. one for each dimension), overlaps among indicators may occur (Hardi & De Souza-Huletey 2000; Bollen 2001), and different indictors may be needed for representing the same target in different contexts.

Franceschini et al's definition of indicators as an 'application' is a little unclear, however. Also their notion of the 'representation target' is, if not unclear, slightly disturbing, as it connotates with mundane, quantitative 'policy targets'. While we at a loss for a more accurate term in the latter case (and hence retain it for now), we will continue through the literature for better definitions of the indicator concept in itself.

Another comprehensive, if slightly less rigorous, account of indicator phenomenology and literature is given by Gilberto Gallopin (1997; 1996). Based on the account Gallopin concludes: "…indicators are *variables,*" where a variable, "…is an operational representation of an attribute (quality, characteristic, property) of a system." (Gallopin 1997, p 14).

This definition is attractive because it is concrete, yet still 'naked', avoiding an overload of the definition with a priori functions, or uses indicators *may* or may *not* have in practice. The variable is the core element in many indicator definitions (e.g. Bollen 2004,p 7282; Mendoza & Prabhu 2003, p 330; Riley 2001), and Gallopin's definition itself is frequently cited throughout the indicator literature (e.g. Milman & Short 2008; Hezri 2006; Veleva & Ellenbecker 2001).

However it is also a bit *too* naked, deprived of any particularities to distinguish indicators from other types of variables. Here we are interested in features that allow such distinctions, in order to single out and pin down our subject.

In another reference Gallopin loosely specifies indicators further as …" variables that summarise or otherwise simplify relevant information, make visible or perceptible phenomena of interest, and quantify, measure, and communicate relevant information." (Gallopin 1996, p 108). Similarly Hammond et al (1995) speak of indicators as having "… two defining characteristics." They, "…quantify information so its significance is more readily apparent"; and "…simplify information about complex phenomena to improve communication." (Hammond et al 1995, p 1). Also according to Ramos et al (2004, p 49), an indicator is, ": a sign that conveys a complex message, potentially resulting from numerous factors in a simplified and useful manner. An environmental indicator is derived from a single variable to reflect some environmental attribute."

As seen, *quantification* is often mentioned in indicator definitions (see also Parris & Kaates 2003; National Science Board 2008), but indicators can be qualitative as well, and in some cases (like measuring opinions) even as the only possible option (Adcock & Collier 2001).

Another very well known indicator definition by the OECD highlights additional important aspects. An indicator is… " a parameter, or a value derived from parameters (…) *with a significance extending beyond that directly associated* with a parameter value (OECD, 2003, emphasis added). Hence, an indicator variable should measure and represent 'more than itself', so to speak (Jackson et al. 2000), which immediately begs the question of 'how much more' is required to make a measure into an indicator, a question that the literature seems to leave to practice or context to decide. OECD's mentioning of the 'value' is also essential, as it is the necessary practical companion to the variable: without actual values (observations, data), the variable may represent something in the abstract, but measures nothing.

This general idea of indicators as representation by simplification in the service of communication has been formulated and exemplified by many other scholars, such as Adriaanse (1993), Alfsen & Saebo (1993), and see also Bauler 2004). The 'variables' referred to may be simple or complex, e.g. taking the shape of binaries, numbers, ratios, formulae, or multidimensional algorithms depending on the richness of the 'target' to be represented and the sophistication of the knowledge. The common key distinction seems to be nothing more than indicators are variables *chosen* (potentially among a number of other candidate variables) by someone to serve as representation in a particular context; a choice which may in each case be more or less explicit and justified by *criteria* (e.g Niemeijer & de Groot 2008; WHO 2006; Riley 2001) Hence, indicators are variables recognized, selected, installed or emerging as indicators, for someone, in a context. A more precise distinction can hardly be given.

Some scholars suggest than an indicator is essentially always an instrument for decision or control (Rey-Valette et al 2007), implying that its variable *should always measure in relation to a standard*, baseline condition, or threshold (Riley 2001). Such components are indeed frequently incorporated in indicators (for example indicators giving 'distance to target' for environmental pressures, as in Adriaanse (1993), or indicators comparing organizational performance with the 'best in class' as in Beatham et al (2004)). However, many indicators do not include such a reference; their function may simply be to describe an important trend with no evaluation, or feed into an evaluative interpretation undertaken subsequently. Hence, a control reference may or may not be part of an indicator, but is not a true distinguishing characteristic.

Another characteristic to the definition of indicators has been proposed, namely that of being *regularly or recurrently reported* [1]. Even if that may be the case for many indicators, and likely to be important for their usefulness and influence, recurrence cannot be considered as an intrinsic property, as indicators are applied in many 'one time' or 'ad hoc' decisions as well; hence, hardly any of the references mention it as a defining characteristic. Also the notion of recurrence is obviously shared with non-indicator variables contained in general statistics, surveys, surveillance etc. The reporting frequency of indicators can rather be seen as a dimension of its quality pertaining to the particular system or *frameworks* they are embedded within. We will return to frameworks in a following section.

[1] "Indicators are *repeated observations* of natural and social phenomena that represent systematic feedback. They provide quantitative measures of the economy, human well being, and impacts of human activities on the natural world" (National Research Council 1999, emphasis added).

More fundamentally, the basic view of indicators as 'representations' of phenomena has been questioned (Catasus & Gröjer 2006). The alternative is to depict them rather as 'social constructions' of reality, essentially defining, rather than mirroring it. This need not be a contradiction, however, since 'representation' in human communication is hard to imagine without at least some degree of construction (Mouck 2004). The inherent selection aspect already mentioned is also a close companion to construction. We would therefore rather *add* construction to representation as part of the indicator concept than replace the one with the other.

Summing up, while most of the specifications of indicators cited from the literature build up to the same general understanding, they refer to ideal or *intended* functions of indicators drawn from theory or prescription and provide limited guidance to make *empirical* distinctions between indicators proper and other (non-indicator) variables that are informing policy. It will therefore help the research into use and influence to consider entities that have been explicitly designated or recognized as 'indicators' by actors within the particular application or policy area to be studied.

From the above we can now propose to summarize a definition of indicators to guide the research in POINT, according to which,

> *indicators are understood as variables,* which are constructed and selected as 'indicators' by someone, to operationally represent properties of wider 'representation targets'; and which are fed with values in order to allow simplified *communication* about and possibly *control* over these targets.

As a specific knowledge concept, indicators relate to other related concepts (defined in Table 3) in the way illustrated in the simplified logic of Figure 4, drawn up with inspiration from Segnestam (1999) and Sydenham (2002).

Table 3. Definitions of selected 'knowledge concepts' (various encyclopaedia; Sydenham 2003; Riley 2001, Gallopin 1997)

Value:[2]	Magnitude; quantity; number represented by a figure, symbol, or the like.
Variable:[3]	A characteristic measured on a subject or unit. Quantity whose value may vary over the course of an experiment, across samples, or during the operation of a system.
Data:	Raw symbols that are obtained from a measurement system
Information:	Data that have meaning
Knowledge:	Information put into a context
Communication:	Exchange of information between individuals through a common system of symbols
Statistics:	The science of collecting, summarizing, and analyzing numerical data
Evaluation (1) [4]	Attributions of values to individual judgments

[2] Values and variables may not need to be 'quantities' to serve as indicators; 'nominal' indicators exist.
[3] See note 1
[4] 'Evaluation (1) here means a judgmental cognitive act, while it elsewhere referred to as a more general comprehensive review exercise, studied in evaluation research (see e.g Weiss 1979).

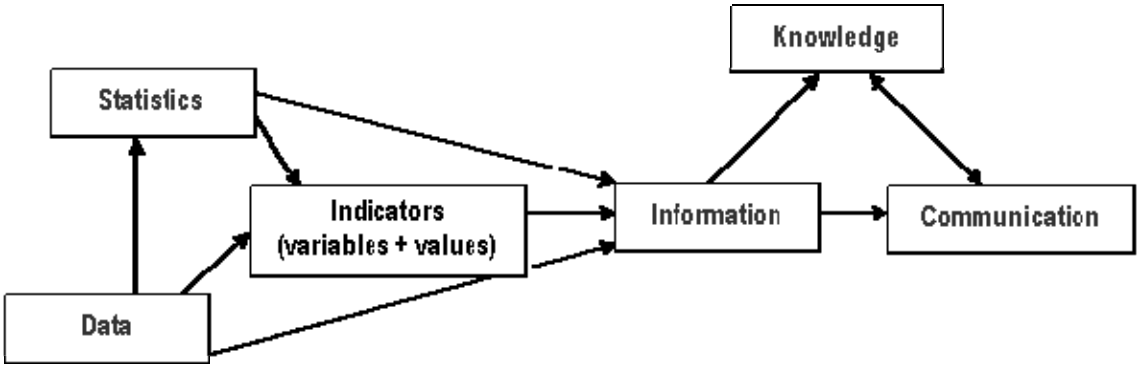

Figure 4. Logical position of indicators in a set of related concepts.

According to this logic, the variables of indicators give meaning to values obtained from (for example) data or statistics, thereby providing information, that can lead to knowledge and/or enable (simplified) communication. Indicators has to be interpreted (given meaning as information) before they can produce knowledge or assist communication. 'Evaluation' may be part of the interpretation but is not shown in the logic; as noted it can be built into the indicator or occur elsewhere in the process, or not at all.

In terms of *what* is used, if an indicator is used, three different aspects can now be identified:

The basic aspect is the *variable*. Use of the variable essentially means that the indicator is accepted as a representation of a phenomenon, target or problem of interest, without necessarily using the specific data or the values of the indicators in each case. An example could be adopting the variable 'parts per million (ppm) of CO2 equivalent in the atmosphere' as a main indicator for 'climate change', or agreeing to use 'number of peer reviewed ISI publications per full-time scientist' as an indicator of academic performance of a university. If the indicator variable directly *shapes* the variables used in policy it may have considerable influence; but it may also just be *reflecting* a variable already defined in the policy context, in which case the influence could be more modest. Several different variables may also exist
.
The second aspect concerns the *value*, or the actual results shown by an indicator. Use of the value aspect would mean that a message carried in quantitative or qualitative information by the indicator is referred to or taken into account. For example if an indicator suggests that '390' ppm CO2 equivalent' describes the state of the world's climate today, or' 1,5 ISI publication' per year describes the academic performance, and those values are referred to, used in negotiation, or perhaps even triggering a response, then the value aspect of the indicator is used. One can say that this represents another, possibly stronger, possibility of influence than referring to the variable; these may coincide, of course, but may also be set apart in time.

The third aspect is making use of an *evaluation* of the results, to the extent that such an evaluation is included in the indicator (e.g. as a threshold, limit, benchmark etc built into the indicator). Influence of the evaluation aspect means that a built-in judgment is taken into account in policy. An example would be if an indicator juxtapose the '390 ppm CO2 equivalent'

with a pre-industrial level, and connect the distance to a certain danger level; or if '1,5 ISI publication' is set against a best-in-class, of say 3,5, which is linked to formula for allocation of research funding. Use of the evaluation aspect suggests possibility for strong influence. An evaluation may of course take place even if evaluation is not built into the indicator, in which case the use of the indicator may still be noticeable (the value is used as an argument), but less deterministic (the evaluation is not given). There may also be discrepancies or conflicts between built-in and external evaluation. Looking into the evaluation aspect and where it comes from may be particularly revealing in terms of exploring the use and influence of indicators.

Hence it is important (as also implied by Figure 4) that indicators may not be the only source of similar information content in the area of interest. Each of the three aspects may also be supplied from other manifestations of information etc. as crudely depicted in Figure 5. It will therefore be useful if the research can seek out in each case if the variables, values or evaluations that are referred to, stem from the indicators under study, uniquely, directly, indirectly, or not at all. We suspect that indicators as well as other information sources will often be simultaneously involved, but we are particularly interested in examples where indicators may be identified as significant sources.

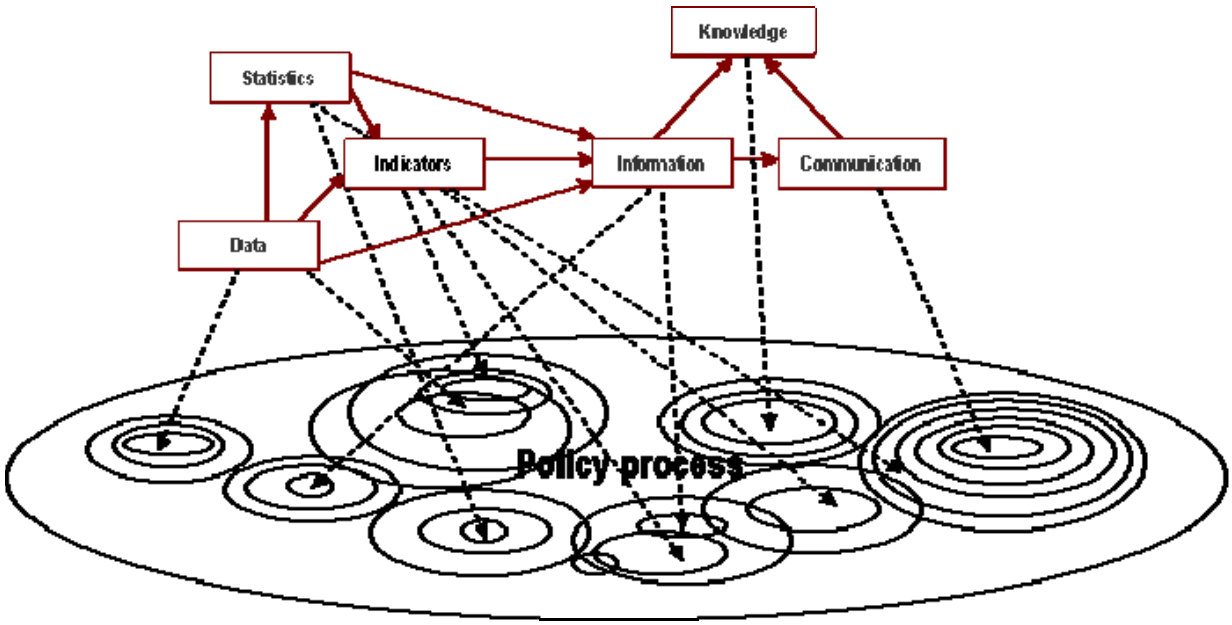

Figure 5. Different sources of variables, values, and evaluations may be mixed in policy use.

(P/Q1): We thus suggest as a first *proposition*, that an indicator may inform 'policy' though supply of variables, values, and evaluations in various combinations, while its type of use and influence is likely to depend upon which of the elements or combinations are originating in the indicator and which ones are not. An indicator being the originating source of variable, values and evaluation applied in policy making, suggest a potential for strong influence.

Indicator frameworks

However, indicators are normally not used in singular, but are part of sets or systems of indicators, which may again be shaped or guided by 'frameworks'. Indicator frameworks are conceptual devices that connect different indicators to broader ideas or paradigms of the 'representation targets' involved, and often also to a purpose of the indication (Becker 2007; Gudmundsson 2004; Lyytimäki & Rosenström 2008). Simple frameworks may just delimit and organise a *set* of indicators to describe different properties, while more elaborate ones such as the D-P-S-I-R framework for environmental reporting (EEA 1999) or the 'Balanced Scorecard' for business management (Mouritsen et al 2005) organise indicators like *systems*, where the indicators are supposed to connect and complement one another to allow more comprehensive representations.

Gudmundsson (2003) proposes to distinguish between the conceptual (inner) and application (outer) parts of indicator frameworks. The *conceptual* part provides a perspective on the 'representation targets' for the framework, delimiting and organizing the scope of indicator content; which dimensions are recognized; how are they to be represented. Examples of delimiting and organizing concepts include causal frameworks (like P-S-R, D-S-R, D-P-S-I-R); epistemic domain frameworks (e.g. environmental, social, economic, combined), or sectoral frameworks (transport, energy, agriculture etc) (Maclaren 1996). The *application* part links indicators to different types of function or purpose of the indicators; an 'application target', if one likes. Distinctions in this part can be made between for example 'information', 'monitoring' and 'control' oriented frameworks, with increasing specificity of the intended use (Gudmundsson 2004); or according to different stages in a policy process, such as 'ex ante assessment', 'ongoing monitoring' or 'ex post evaluation' frameworks (EEA 1999; Hezri 2005). Hence the frameworks can serve in various ways as 'filters' for which indicator are needed and subsequently used.

Two additional dimensions of frameworks are relevant for indicator use namely the *aggregation* structure and the */ogistical* aspects . A*ggregation* of indicators can refer to spatial, temporal or thematic aggregation of indicators (Bauler 2007), but for frameworks it usually refers to aggregation across themes. A common way to illustrate this dimensions is the 'pyramid' with separate tiers of indicator integration (Hammond et al 1995; Mitchell 1996; Segnestam 2002, Graffy 2007). Each tier may be catering to different 'user groups', such as experts, policy maker and citizens. The top tier (if there is one) is usually the most controversial. The procedural or */ogistical*, aspects of an indicator framework, which applies to actual systems, and not pure conceptual models (EUROSTAT 2009; UNEP/CBD/SBSTTA 2003). The logistical part defines how the indicators are produced, maintained and reported; this is also sometimes referred to as their 'infrastructure' (Kennerley & Neely 2003). Logistical design features can include specifications such as data collection routines; data quality control, graphic formats, responsibilities, time schedules, funding etc. Some systems may be highly structured in these respects, while others may be more ad-hoc or improvised or still emerging Major, frequently cycling systems will typically be more structured in logistical terms than ad hoc ones. As the running of an indicator system is not free, a special topic is finance, where frameworks with secured funding may be more stable and hence influential (Gahin et al 2003, p 664).

'Frameworks' may be important in two ways to be considered here,

First, the indicator sets to be studied may be organized according to one or more frameworks. These frameworks may suggest certain definitions or interpretations or interrelations of the indicators: this may support the use if indicator, but my also disturb if it is not compatible with the policy contexts where the indicators are supposed to be used. It will therefore be relevant for the

research to identify and describe any framework(s) present, and look into how much these 'frameworks' mean for the users and their uses of the indicators.

Secondly, the frameworks may contribute concepts or ideas which themselves can resonate into or shape policy, even if none of the individual indicators in the framework are used very much, quite like the way variables of individual indicators may be accepted even if the concrete values (numbers, date etc) are not. An example could be if a policy strategy imports concepts like 'three pillars of sustainability', or 'Balanced scorecard', or 'international benchmarking' from an indicator framework that is informing it. In this respect the origin, emergence and history of the framework vis a vis the policy context could be important part of the account. We could see this as a *fourth aspect* of indicator use in addition the aspects of variable, value and evaluation of the individual indicators, namely use of the framework (e.g. to shape policy).

We will make the following proposition:

(P/Q2) Indicator use is not confined to the use of individual indicators, it also involves using sets and frameworks of indicators as a whole or in part. It should be possible to detect if and how 'frameworks' are applied in defining and selecting indicators, reporting and interpreting the results, and in adjusting policies according to new concepts. If a framework so to speak prescribes a joint application of several indicators together, then the framework may influence policy in a way that is additional to each individual indicator; for example indicators may be used 'just because' it is included in a framework which is used, or not used, because it is not. In addition, indicator framework may contribute to shape policy frameworks and thereby infuse propensity for future indicator use into them.

Indicators and policy functions

How do indicators apply to policy and decision making?. In this section we address the functions and roles indicators can be supposed to play in connection with policy.

The use of indicators in policy can be addressed in two ways. The one is to start form general indicator functions and consider them in the context of policy making. The starting point can be a range of general 'informative' functions of indicators such as description, surveillance, anticipation etc, and general 'action' functions like selection, ranking, control, decision, etc (Franceschini et al 2006). The other way is to start from characteristics of 'policy'; to consider how policy making, processes, institutions etc operate and how they are likely to shape the conditions for letting indicators play any such or other roles. The latter again depend on the understanding of what 'policy' etc is, which is a large and controversial subject that we will deal with in a partial way in section 6.

Here we take the first approach by following Boulanger (2007) who specifically addresses the role of indicators in three different perspectives or policy models. The most dominant one has been what he calls the 'rational-positivist' model, emphasising instrumental policy functions of indicators like aiming to quantify objectives and evaluate alternatives. The second is the 'Discursive-constructivist' model, where indicators are seen as mechanisms to frame problems, identify shared values and build a common discourse. In Boulanger's third model indicators are part of a confliction context with perpetual competition between interests. The use of indicators is mostly seen as an instrument of strategic manipulation. Cobb & Rixford (1998) have two categories very

similar to Boulanger's two first ones, by them called 'positivist' end 'historicist' indicators respectively.

In this section we focus on the roles and functions of indicators in the rational, positivist or instrumental mode, where other modes are considered below in section 5.

Indicators functions from a rational viewpoint

The rational policy indicator literature tend to focus on a similar range of indicator policy functions (see e.g. UNESCO-SCOPE 2006; Gallopin 1997). A typical list is the given by Briguglio (2003);

- to support decision-making
- to set targets and establish standards
- to disseminate information
- to focus the discussion
- to promote the idea of integrated action
- to monitor and evaluate developments

In this view of policy, 'use' of indicators is synonymous with matching such functions with the most accurate an appropriate measures (Boulanger 2007; NCHOD 2005; Jackson et al 2000). It is useful to divide indicators into two main functional groups that we will call 'system analysis' indicators versus and 'performance' indicators.

Functions of 'System' indicators

The system view aims to provide comprehensive indicators to assess the conditions of systems of interest for policy. A way to structure system needs is proposed by the European Environment Agency (EEA 2003) as depicted in Figure 6 where indicator functions are referred to separate stages of a *policy cycle*. The illustration suggests a different function for indicators in each stage, although without detailing functions explicitly.

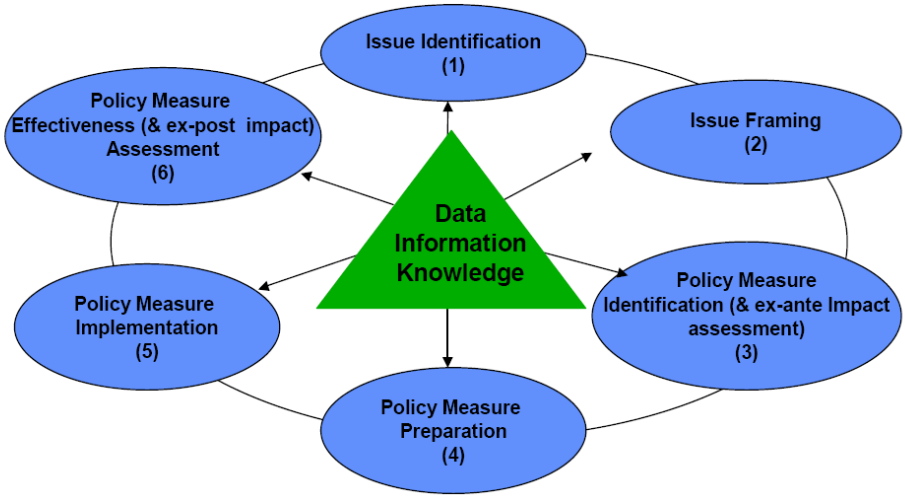

Figure 6 Knowledge and the Policy Cycle (EEA 2003)

Illner (1984) has tried to map a more specific set of indicator functions to the different stages in the planning process (Table 4). Ilner hints at how certain functions in a planning cycle tend to require different types of indicators; 'descriptive' and 'analytic' (more detailed, in depth) indicators in the initial *diagnostic* stage of the process (issues identification and framing in the EEA model); later indicators that connect directly to programme goals and results are required, such as simple 'control' indicators in the evaluation phase ('ex post impact assessment' with the EEA model).

Table 4 Functional types of indicators (Illner 1984)

	Indicators	
Stage in the planning	**Type**	**Function**
Diagnosis	Descriptive	Registration and description of the initial situation
	Analytical indicators	Analysis of the initial situation
Programming, realization	Prognostic indicators	Characterisation of expected or potential development
	Programming indicators	Reflection of principal goals
	Planning indicators	Reflection of medium and short term goals
	Social normatives	Quantification of goals and means
Evaluation	Control indicators	Description of final situation
	Indicators of impact	Reflection of outcomes
	Indicators of effectiveness	Reflection of effectiveness

A basic typology of indicators for system analytic functions has also been defined by the European Environment Agency (EEA 1999), as follows:

- Type A: Descriptive indicators, helping to identify what is happening to the environment
- Type B: Normative indicators, helping to assess a problem, using a standard, criterion or target
- Type C: Ratio or efficiency indicators, helping to assess relative improvement
- Type D: Total Welfare indicators, helping to aggregate information to one number

The typology involves increments in complexity of the indicators from type A to D. The rational problem solving functions mentioned by Boulanger (2007) would best be served by Type B (normative) or type D (aggregate) indicators. Simple information provision can use type A. A diagnostic function could apply ratio indicators to decompose trends into sub-trends to identify underlying problematic factors. A category of special interest of POINT (WP4) are *composite indicators*. They link as aggregates to the 'type D' in EEA's terminology above, but avoids any intrinsic parameter in which to perform the aggregation. The OECD defines it as follows,

> "A composite indicator is formed when individual indicators are compiled into a single index, on the basis of an underlying model of the multi-dimensional concept that is being measured. A composite indicator measures multi-dimensional concepts (e.g. competitiveness, e-trade or environmental quality) which cannot be captured by a single indicator." (OECD Glossary of Statistical terms)

The function of the composite is essentially to avoid communicational shortcomings with multiple (potentially conflicting) indicators for different dimensions of a phenomenon, 'not to see the forest for the trees'. On the other hand they are not helpful for guiding specific system interventions. Following Illner, above, the complexity of composites may suggest they have most relevance for early descriptive phases of a policy making process.

A wide variety of system indicator functions and associated typologies exist for specific areas. Examples include indices to assess biodiversity (e.g. Mace & Baille 2007), or air quality (Franceschini et al 2005); monitoring the business sector with leading, conjoint or lagging indicators (Seip & McNown 2007), and measuring the innovation capacity of nations (Katz 2006).

For all system analysis indicators the rational assumption would be that measures most effectively reflecting essential system conditions or dynamics of relevance for a particular problem stage and decision situation– be it aggregate problem description or detailed implementation monitoring – are the ones that will be used.

Performance indicators

The other set of indicator functions is more directed towards management and control than on measuring system conditions. Those are functions related to measuring the performance of policies, projects, or the policy institutions themselves (Bouckaert & Halligan 2007; Carter et al 1993; Julnes & Holzer 2003). We will refer to such indicators as *performance indicators* or performance measures. Performance measures are used at different levels, from small projects or organizational units, to programs, to whole systems of government (Bouckaert & Halligan 2007).

Performance indicators are different from system indicators in the sense that they seek to measure what or how 'someone' not 'something' is doing (moreover assuming 'someone' has 'agency'). An important function of performance indicators in the policy context is thus to ensure *accountability* (Hoernig & Mark 2004; Thomas 2006). Accountability means that responsibility for actions and results (or lack there of) can be established though performance measurement of the proper entity by using indicators appropriately connecting to the 'agent'.

Organisational performance indicators can serve several additional 'policy' functions compared to the system types described above. Examples include internal management functions such as to motivate and inspire staff, legitimisation functions towards the external environment, and cultural functions such as celebration. Several of those functions go beyond pure instrumental and accountability tasks, to include also a range of communicative and social aspects (see Table 5).

Table 5 Types of performance indicator functions (after Behn 2003)

Purpose	**Question the performance measure can help answer**
Evaluate	How well the organisation is performing
Control	If employees are doing the right things
Budget	Which programs, people, or projects money should be spent on
Motivate	Inspire staff, managers, citizens etc to help improve performance
Promote	Convince external stakeholders that agency is performing well
Celebrate	Cause for celebration of success
Learn	Identify working/not working activities
Improve	Identify action that can improve performance

A classical typology of performance indicators exist. In includes indicators that monitor the *input to* organization (for example funding or manpower) and the *output from* activities (say produced hours of telecommunication service), in order to control e.g. if the organisation is working properly

and the staff is delivering on time and budget. *Effectiveness* and *efficiency* indicators compare the input with outputs, or goals (Audit Commission 2000; Carter et al 1993). *Outcome* indicators link the activities and results to changes in the 'real' world, for example impact of the agency's activities on target group behaviour, economic sectors, or the environment. The typology is illustrated in Table 6. There are other and more elaborate typologies in place also here, as we will touch upon later, but the input-output-outcome system is really the basis,

Table 6 Performance indicator typology (Carter et al 1993)	
Input indicator	Resources required to provide a service or product (e.g. manpower)
Process indicator	The way the service is produced
Output indicator	The services, products or results (e.g. number of facilities built)
Outcome indicator	The impact or final results (e.g. clean water)
Efficiency indicator	Ratio input/output
Effectiveness indicator	Ratio input/goals

An example is the framework used to evaluate European expenditure programmes (Nagarajan & Vanheukelen, 1997). which adopts the input-output-outcome system mentioned before (depicted in Figure 7). Kennerley & Neely (2003 and 2002); discuss frameworks in the area of business performance measurement, emphasizing the presence of three inter-related elements; 1) Individual measures of efficiency and effectiveness.; 2) Sets of measures that combine to assess the performance of an organisation as a whole. and 3) Supporting 'infrastructure' that enables data to be acquired, collated, sorted, analysed, interpreted and disseminated (Kennerley & Neely 2003, p 218).

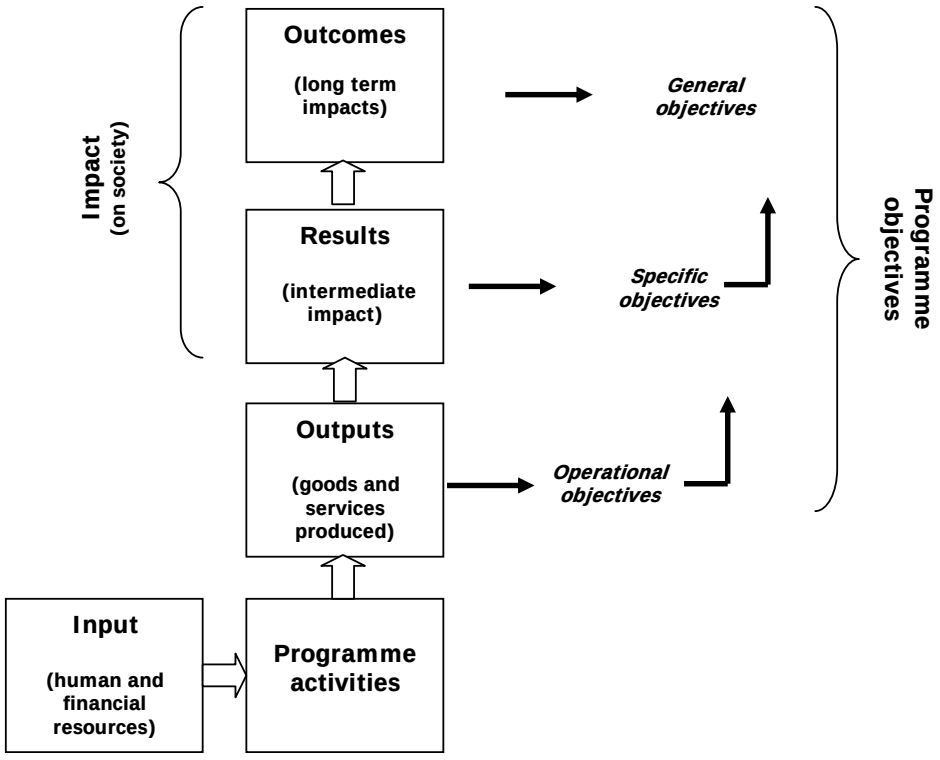

Figure 7 Policy evaluation framework (after Nagarajan & Vanheukelen, 1997)

Also in performance management the rational assumption would be that the types of indicators used to measure performance are the ones best suited to each management task. However, in this area the assumption of agency (and a more bounded rationality concept) would suggest that indicator use especially must take into account strategic human behaviour, including possible negative or evasive reactions of agents to the monitoring regime itself (Bevan & Hood 2006b). Transparent agency linkages enable accountability but may also provoke tactic reaction. Using indicators indented for control to function like motivation and control might be directly counterproductive.

Summing up the two examples we can note that both system analysis and performance frameworks each entail a variety of functions requiring very different types of indicators to represent essentially the same entity for each function (different policy stages, different management tasks). The two framework differ somewhat in regard to what is being represented (systems versus organisational performance, although with overlaps) but perhaps more significantly in regard to the form of representation (absence/presence of human self reference). This gives different contexts for considering the rational use of indicators, where performance indicators not only have to measure accurately for control but also appropriately for acceptance.

The following proposition for the research is made.

(P/Q3): Indicators that are used are indicators that re tailored to specific policy/management tasks within the appropriate framework (even if the 'task' may be to produce a comprehensive overview, or identify the most important problems); performance indicators in performance frameworks may have more diverse 'uses' (reactions) than system analytic indicators , and will be used more rationally if they are designed with consideration for possible strategic responses.

Summary of section 4

The review in this section is intended as a 'rough guide', or a crude general typology of indicator functions and types, that is meant for use as a reference to describe the particular indicator-policy linkages to be studied empirically, in a step that can be called 'indicator-framework sub-analysis.'

The sub analyis should as a minimum cover
What is origin of indicator/framework? What is official function of indicators? Which types of indicators/framework is it? Who are producing indicators? How and how often reported, to whom

The typologies in the section will allow some degree of analytical characterization of components of the indicator system to be studied (which types of indicators; which types of frameworks), to inform which may later be useful in analysis of use and influence of the indicators.

In this section definitions of 'indicators' and 'frameworks' have been set up, and four aspects of indicators that could be give rise to different types of use and influence have been identified, the variable, values, evaluation, and the frameworks; it has also been noted that the indicators may not always be the only source to supply this information; on the contrary it may be relevant to examine in each case to what extent indicator aspects are the original feeders of the information or merely serve as reflections of other information sources (from data and statistics, to 'intrinsic' knowledge).

We have further noted the potential problems of clearly identifying frameworks, although they may be important both as from and thus co-determinants of use, and of items that my be used themselves. important. Hopefully we will understand more about the role of frameworks when the analyses are made.

Analysing indicators or frameworks without the other is one option, another is to conduct a parallel or integrated analysts of a framework with in depth study of selected indicators within them.

Because of the complexity of' public policy making' it is difficult to establish a unique classification of policy functions of indicators. Typical functions of indicators include one such as problem identification and description; characterisation of expected development, target or standard setting, assessment of policy measures; monitoring of implementation; evaluation of effectiveness, budget control and accountability. Additional, less instrumental, policy functions may include for example, motivation, promotion, learning, mobilisation, celebration, manipulation.

It has been claimed that indicators and performance measures are related but have separate functions and likely influences, based on a distinction between system oriented versus 'agency' oriented applications. If that is in fact the case may be explored in the research.

5. Use, influence, impact - and pathways

Beyond instrumental functions and use

In the above, indicators have been discussed mostly in what we called a 'rational-positivist' or instrumental mode (Boulanger 2007), with policy functions related to target setting, decision making and evaluation of results.

However, over the last decade or so alternative views on the policy functions of indicators have emerged, especially in research areas like sustainability indicators and performance management (Cobb & Rixford 1998; Meadows 1998; Innes 2003, Hammond et al 1995; Eckerberg & Mineur 2003; Behn 2003). Innes (1998) emphasize especially the communicative roles of indicators in policy and planning, while Rydin (2002) discusses broader roles such as raising awareness, educating the public and motivating civic action. Performance measurement scholars similarly highlight cultural, legitimizing or ritualistic functions of indicators (Collier 1996; Feldman & March 1981). In both areas examples are found in empirical examination of the roles of indicators.

Essential in this 'new' indicator literature is a proposition that indicators *are not best understood* as tools in themselves, but must be studied rather in terms of their role in broader policy processes they inform. Here the two alternative policy models of Boulanger (2002) may fit, the 'Discursive-constructivist' and the 'Strategic' model. In the former model indicators are used in communicative functions with potential associated effects as depicted by Innes, Rydin and others cited above. Indicator qualities such as communicability and dramatization and 'resonance' (Mitchell 1996), become important, even if this may mean that indicators loose accuracy and utility in a more strict 'positivist' sense (Cobb & Rixford 1998). In Boulanger's third model indicators are part of a conflictual context with perpetual competition between interests. The use of indicators is reduced to that of manipulation.

To some extent this change of perspective in indicator research leans on the earlier development in the studies of knowledge and evaluation initiated in connection with major US social programs of the 1960s (Weiss & Bucuvalas 1980; Weiss 1979). We will briefly address this background here since it provides some essential input to develop the notion of 'indicator uses' beyond the functionalist approach.

The early research literature on knowledge and evaluation use focussed primarily on the potential for direct use of results for decision making and 'problem solving'. However, often little evidence of any such use was found when the matter was studied (Weiss 1998; Dahler-Larsen 1998; Vedung 2005); instead, the attention of researchers gradually became alerted to other 'unintended' ways in which the evidence was treated. In particular 'use of evaluations' was established as a research field. A prominent expression was Carol Weiss' identification of six 'forms of research utilization'(Weiss 1979), - see Table 7. ('Use' and 'Utilization' are used as synonyms here).

The studies generally showed, not that 'knowledge driven' or 'problem' solving' uses of research did not occur at all, but were typically found in "....relatively low-level, narrow-gauge decisions. " (Weiss 1979, p 428). These observations recognizes that policy and decision making are essentially social processes, which are likely to strongly shape and frame any knowledge use taking place, rather than the other way around. Newer studies have confirmed but also modified the original

concepts. Additional forms of knowledge use have been proposed, and a few have become 'canonized' (Vedung 1997; Amara et al 2004; Shulha & Cousins 1997; see also Romsdahl 2005) .

Table 7. Forms of Research Utilization (Weiss 1979, here adapted from Bowen & Zwi 2005)

The Knowledge-Driven Model: This model suggests that emergent research about a social problem will lead to direct application to policy; it relies on effective strategies for the transfer of research evidence into practice.

The Problem-Solving Model: This model expects research to provide empirical evidence and conclusions that help solve a policy problem; it assumes that evidence is systematically gathered and applied in the policy process.

The Interactive Model: This model suggests that the search for knowledge moves beyond research to include a variety of sources such as politics and interests; it aims to reflect the complexity of the policymaking process.

The Political Model: In this model, decision-makers are not receptive to research unless it serves political gain, that is, demonstrates proof for a predetermined decision; evidence is sought to justify the problem.

The Tactical Model: This model sees evidence used to support and justify government inaction, or rejection of and delay in commitment to a policy issue

The Enlightenment Model: This model suggests that cumulative research shapes concepts and perspectives that permeate the policy process over time, influencing how people think about social issues.

It seems plausible that similar ways to use *indicators*, compared to 'evaluations' or 'research results' could apply, even if the indicators, as defined previously, are more distinct 'knowledge technologies'. The 'enlightenment' model appears for example to be in line with observations about the broadly 'communicative' uses of indicators found in studies by Innes, Rydin, Behn and Collier cited above. This seems especially applicable to the aspects of indicators as 'variables', and the use of indicator 'frameworks', both of which may be assumed to 'shape concepts' in policy making, particularly in connection with recurring systems over several cycles (Innes 1998).

The 'knowledge driven' and 'problem solving' models of Weiss (see Table 7) fits on the other hand perfectly with the instrumental functions of indicators, and the use of the 'values' layer. We will discuss the 'use' concepts for indicators a little closer in the following, adopting the modified 'use' typology which is now most commonly applied (Amara et al 2004; Shulha & Cousins 1997; Romsdahl 2005).

1) Instrumental use would involve applying knowledge in specific, direct ways, for indicators centring on the value aspects and the variety of the decision and action oriented policy functions described in section 4. By discovering the results of government interventions, indicators could (1) help governments decide whether or not continue with particular policies; (2) expand and institutionalise successful programs and policies and cut back unsuccessful ones; and (3) find out which programmes or policies to modify and in which manner(Vedung 1997; Pawson 2002). In caricature, policy-makers aiming at clearly established policy goals would react to timely published indicators, adjusting policies according to the information provided with the value of the indicators.

2) Conceptual use involves produced knowledge being used in a more general form, more indirectly and less specifically than in instrumental use. The indicator variable, or possibly the

indicator framework, here provides general background information, leading to *'enlightenment'*, "the percolation of new information, ideas and perspectives into the arenas in which decisions are made" (Weiss 1999, 471). The indicators (or operational indicator framework) may thereby affect decision-makers' problem definitions, and provide new perspectives on and insights into the problem area, instead of providing information for a single moment of decision, or to a hypothetical single decision-maker. An effective indicator framework may contribute to re-conceptualize or redefine an area of policy making, or even establish a new field of intervention. The indicator providers could even become 'facilitators' in a negotiation process, bringing forward the various points of view involved, and promoting consensus. Indicator use becomes a *learning process*, and the knowledge created through the process becomes utilised while the program is running.

3) Political use encompasses three related sub-categories:

> ***Legitimisation use***, which has frequently been seen in a negative light, knowledge provision serving as a rationalistic ritual aimed at justifying decisions that have already been taken or policies that are already in place (Vedung 1991; Lampinen 1992, 30-37; Weiss 1999, 477). This corresponds to the third model of Boulanger (2007) , where the role of indicators is strategic. However, explicit legitimisation is also an essential element to secure acceptance of policy in a democracy and therefore reference to evidence has a genuine function even if it is not deterministic (e.g. Feinstein 2002, 434; Valovirta 2002).
>
> ***Tactical use***, is about knowledge (like, say, an indicator system or an indicator based evaluation) being commissioned, for instance, primarily in order to postpone or avoid unwanted decision-making by referring to ongoing or planned work. (Vedung 2001, p 141). It seems plausible that such a use could be made of an indicator set, particularly as the commissioning may involve conceptualisation and logistical support, requiring considerable efforts and time, with a low 'risk' of instrumental consequences.
>
> ***Symbolic use*** means knowledge research being used symbolically, to convey an image or a message and nothing else (Weiss 1999, 477). Indicators would in such a case constitutes a 'façade' intended to give the impression of a rational organisation that sets goals, is prepared for change, has a serious and competent management, and takes rational decisions on the basis of data (Pollitt 1998; Weiss 1999, 472-473; Vedung 2001, 141).

In subsequent studies and debates several further types of 'use' have been proposed. For example the observation that an evaluation process itself (rather than the results) may be the most important for the actors; leading to so-called 'process use' (Shulha et al 1997). This seems like a very plausible effect in the case of an indicator system, emerging over an extended period, in a collaborative process, involving both producers and various users of the indicators, as reported by e.g. Innes (1998); Holden (2008; and Rydin (2002). Such 'process use' of an indicator framework may however not necessarily exclude enlightening or even instrumental uses; on the contrary the two may in the end go hand in hand.

'Imposed use' is yet another type invented in Weiss et al (2005). Imposed use refers to situations in which the use of research knowledge is made obligatory, through reporting requirements, for instance. There are many such examples in the case of indicators, for example legally mandated monitoring and evaluation tasks in connection with European transport and agricultural policies. However, rather than depicting this as yet another type of 'use' one may also analyse the effects on the 'standard' uses (instrumental, political etc) in situations where such imposed mandates are

taken into account as an 'explanatory' factor; e.g. as *institutionalisation* of an indicator framework (see e.g. Innes1990).

Of interest are also distinctions between legitimate use and *misuse*, a controversial subject in the debates. Cousins (2004) propose a typology. Instrumental, symbolic and enlightenment uses he all see as 'legitimate'. On the negative side Cousins puts 'abuse' (which is defined as 'illegitimate suppression' of knowledge) and 'misuse' (mistaken use and mischievous use, that is, deliberate manipulation). Similar concepts have also been applied in indicator research. Feller (2002) and Halachmi (2002) discuss examples of misuse of in performance measurement. Arndt & Oman (2006) reveal extensive (if well intended) misuse in the area of good governance indicators, due to use of intransparent and non-robust methods to assess issues such as of 'corruption' and 'political stability'. However, in many cases it is likely to involve difficulties to distinguish clearly between what is 'use' and 'misuse', as this a) may depend on who's perspective is adopted, and b) may be difficult to detect in practice. On the other hand such uses should not be excluded from consideration.

P(4) Indicators are as knowledge technologies likely to be 'used' in a variety of ways that are similar and at least as broad as the diverse range of 'uses' that have been encountered in the <reseach in other areas like knoweldge utilization and ealuation use. In fact 'indicators' seem particularly well designed (small flexible entities that can easily be shunted into or out of wider frameworks, and quickly communicated) to support more or less any kind of uses, from stricly intrumental calculations of an optimal solution based on indicator values, to the misrepresentation of tends via grahpic manipulation to the inspiration of new broad policy narratives using frameworks such as 'genuine progress' or 'balanced scorecards'; hence the proposition is that is will be possible to reproduce all of the phenomena reported possibly wuth the same few areas.

After having addressed knowledge use as it has been depicted in key references and compared it with indcators, we will now move towards our main concern with 'influence'. However to provide some context for this shift we will first make a brief review of how the connections and pathways between 'pathways' concepts such as production, dissemination, uptake, use, influence and effects have played out in the knowledge and indicator literature

Knowledge use flows and pathways

If we first go back to the instrumental viewpoint, the idea of the pathway is simply a question of transmitting a signal from knowledge producers to users – at the principal level – or submitting the appropriate information to decision makers at the societal level. The intuitive model for the latter case is caricatured by Christofferson & Denisov (2000) in Figure 8.

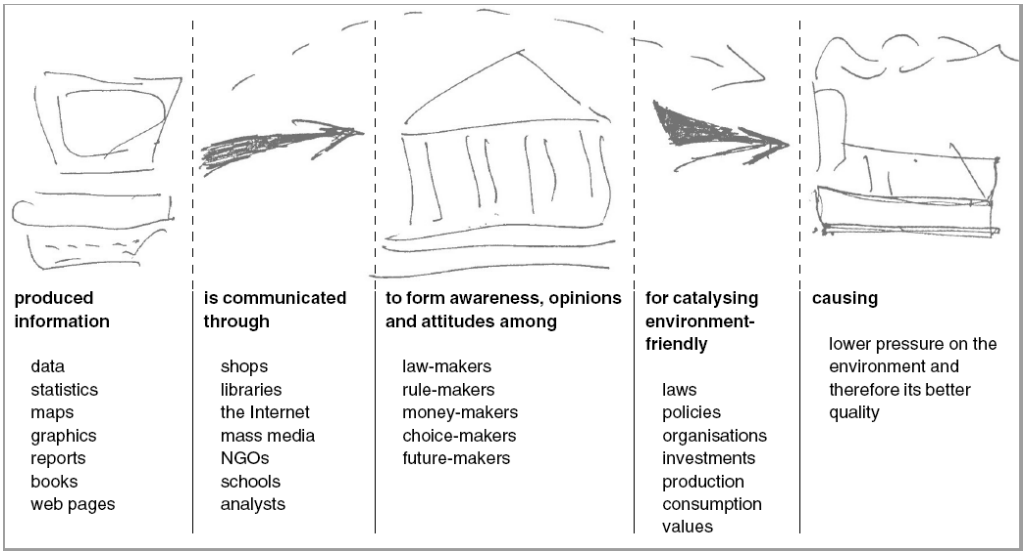

Figure 8 'Information Pathway' in the environmental area (Denisov & Christoffersen 2001)

In terms of *transmitting a signal*, the classical information model involves simply a sender, a receiver, a message and a channel. The trick is to transmit the signal from sender to receiver with as little delay and noise as possible. It has not been uncommon to depict information into policy making in basically the same model, as a question of a more or less simple *transfer pathway*.
To ensure better transfer can in this model be achieved metaphorically by 'optimising the signal'. 'improving the reception' in the policy system or 'increasing the bandwidth' (da Costa et al 2008)?

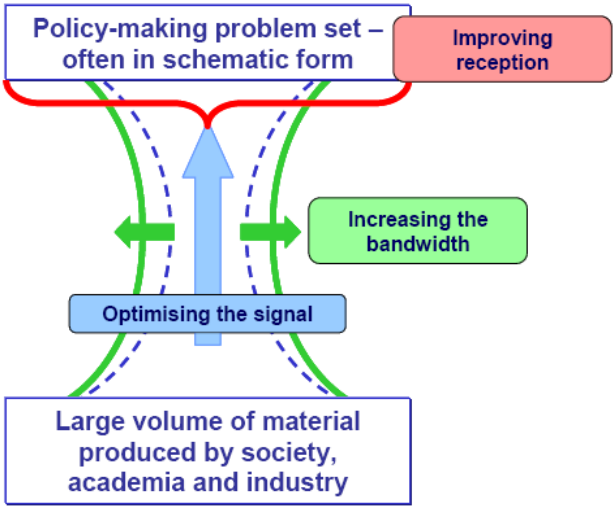

Figure 9 Improving policy communication (da Costa et al 2008)

However, much criticism has been made of the idea that effective communication can be improved in this way; not taking into account the need for mutual involvement between producers and users of information, or iterations over time. Pregernig (2000) adopts the so-called *trimodal model*, according to which knowledge uptake is governed by three other factors, a) the information itself, b) the internal knowledge and experience of the receiver, and c) the external settings (e.g. policy context). A crucial element is the recognition that the user is selective and picks among information offers, according to his or her *interpretations* of what is relevant.

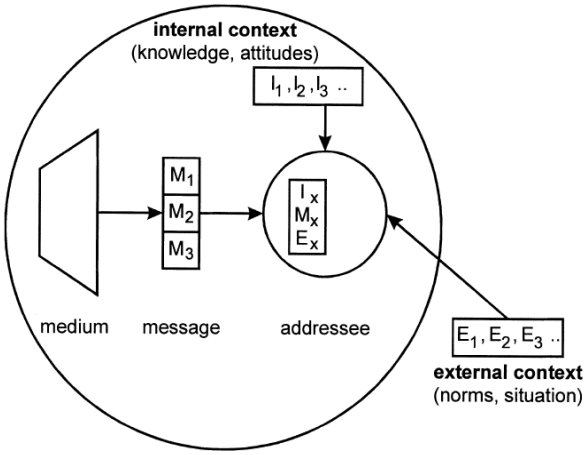

Figure 10 Trimodal modal of information uptake (Pregering 2000)

A more detailed and policy relevant notion of knowledge transfer processes is Knott & Wildawsky's classical 'ladder of research utilization' involving six steps where the transfer of knowledge can go wrong in each of them (Knott & Wildawsky 1980; here Landry et al 2001):

1) Transmission of results to the practitioners and professionals
2) Cognition of the research; it was read and understood by the practitioners and professionals concerned
3) Reference : the work is cited as a reference in the reports, studies, and strategies of action elaborated by practitioners and professionals
4) Effort : Efforts were made to adopt the results of research by practitioners and professionals
5) Influence : Research results influenced the choice and decision of practitioners and professionals
6) Application: research results gave rise to applications and extension by the practitioners and professionals concerned

The ladder is thought of as cumulative in the sense that all these stages of knowledge use are important to reach the goal of transfer and build on each other. The model has been used in several studies, and has been an inspiration for a number of other researchers seeking to find the 'weak link' (Landry et al 2001, see also Hezri 2006;). As we shall see similar notions is will be used to devise pathways in the indicator area, including in this text, although the presence of frameworks and other elements may contribute to systematize and speed up parts of the process in this case.

A more detailed knowledge pathway concept is given by Beyer & Trice (1982).

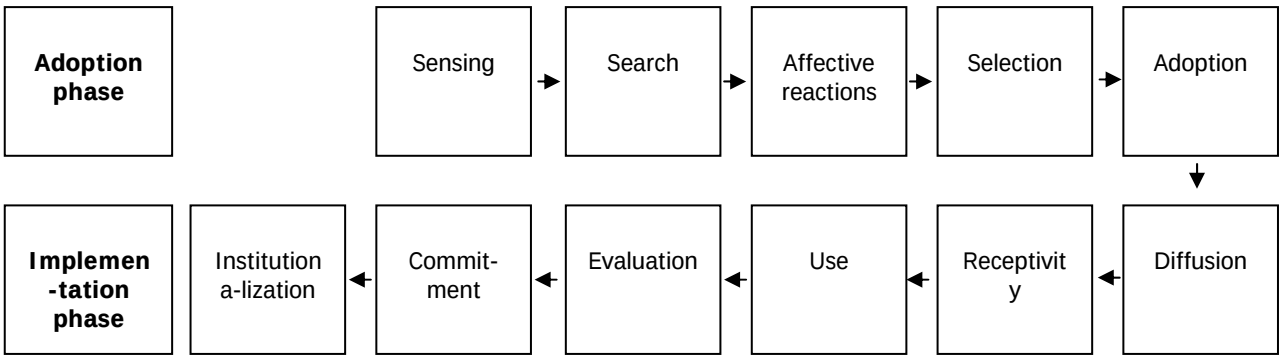

Figure 11. Detailed process of 'research utilization' (after Beyer & Trice1982)

Here the policy maker is supposed to play a more active role in the seeking of information. The knowledge use is divided into two phases, adoption of the knowledge and implementation of it. Research by Kotharia et al (2005) in the health sector, and Julnes & Holzer (2001) in performance management confirm that this distinction is important, since it is not the same factors that seem to control use of knowledge in each of the two phases; Rational/bureaucratic factors have been found to be are predominant in the adoption of a performance measurement system, whereas more political and cultural factors are active in its implementation and use (Julnes & Holzer 2001 p 702 f). Kothari et al (2005) also found different mechanisms at work in each stage.

In this process, different profound cognitive and emotional human functions are considered, and linked to an organisational environment which is assumed to condition the apprehension of research knowledge. According to Beyer & Trice (1982, p 615), the details are important for understanding the full process. Researchers should study both the subtle and the more visible steps in the chain of knowledge use, primarily by observing people in organizations. The model illustrates how one may detail the process 'depth' and 'length' almost infinitely. Still the process itself is perceived as unidirectional, parabolic, and context insensitive.

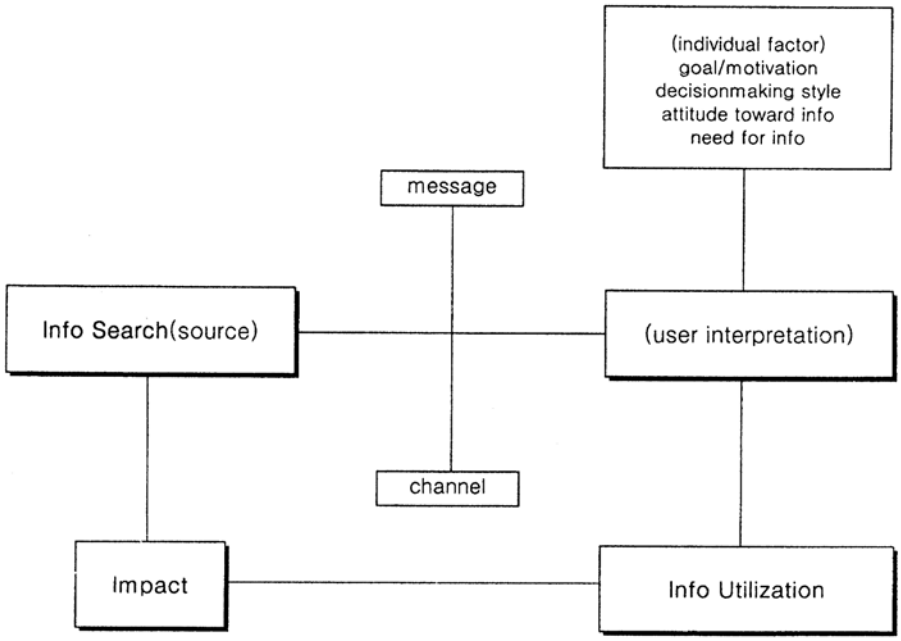

Figure 12. A cycle model of information processing (Rich & Oh 2000)

An apparently simpler, but conceptually more advanced pathway is presented by Rich & Oh (2000) in the form of the cyclical notion shown in Figure 12. The user seeks out messages through available channels, and again (as in the tri-modal model) selects information according to interpretation based on knowledge, motivations and also contextual need. For Rich & Oh it is important that the decision maker (in this case) not only decides to utilize the information (which can be simply to read it) but also considers its impact. This stage, they claim, is critical for whether and how the decision maker will use the information at all: If there is no experience of impact, there are no grounds for seeking new information. The notion of the cycle, *as part of a parallel action or policy cycle producing results* becomes important to the non-linear flow; it can be interrupted in each step and then only previous experience will determine which messages are considered relevant.

Indicator pathways

With regard to pathway notions in the indicator literature, it seems to be less developed. Most emphasis has been put on defining the early phases of the process to ensure the proper identification and selection of adequate system or performance indicators, as for example depicted by Keeble et al (2002) in Figure 13. What comes after has typically been given less attention; indicators have generally been supposed to 'implement themselves'.

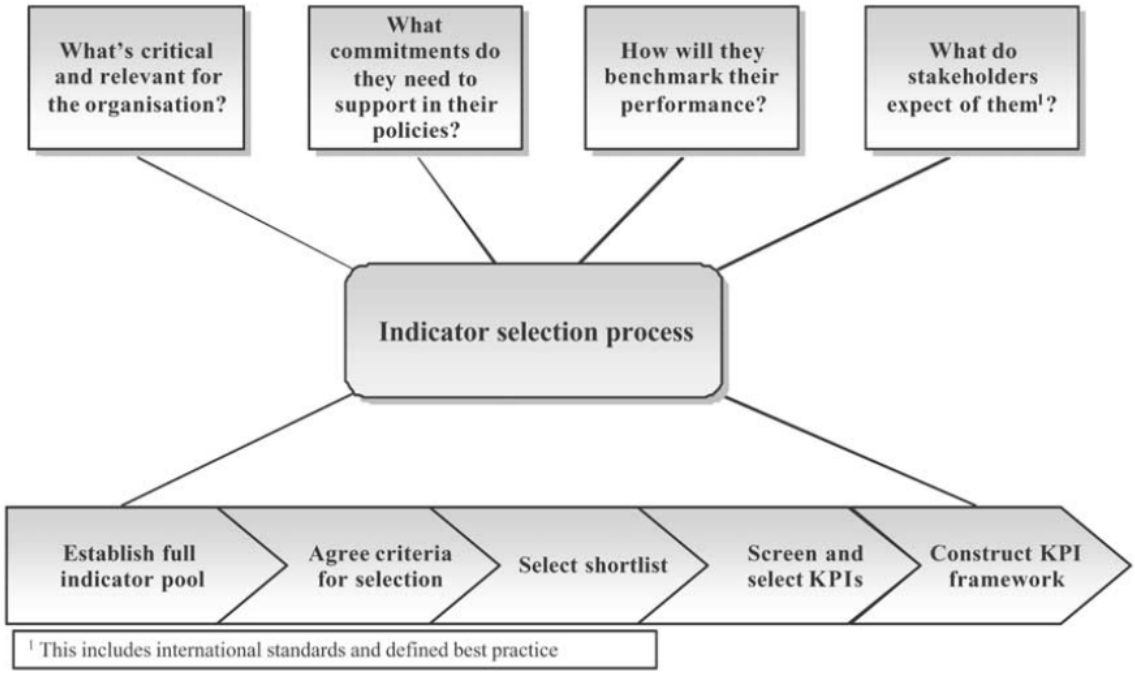

Figure 13 Stages of an indicator production chain (Keeble et al 2002)

Similar elaborate 'pathways' as the ones above for research use have to our knowledge rarely been devised specifically for the study of indicators. The main concern has been to 'get the signals right', at least in the (dominating) instrumental perspective. A substantial literature exists about how to define and select appropriate indicators based on assessment criteria such as validity, reliability, sensitivity, specificity, measurability and conceptual precision (Niemeijer & De Groot 2008; NCHOD 2005; Audit Commission 2000, Jackson et al. 2000).

A concern for the process beyond transmission has I some cases been driven by prescriptive concerns, especially in the area of sustainability indicators and reporting, which is heavily inscribed in process-oriented, participatory and citizen-empowerment philosophy (e.g. Hardi & Zdan 1997; Maclaren 1996; Holden 2008). Indicators can be used to engage and involve citizens in social change; indicators can also be used to gauge progress towards desired changes; scholars like Maclaren (1996), Innes (1998) and Rydin (2002) following the more 'communicative' approach to indicators tend to favour a 'cyclical' view on knowledge pathways where the interaction between policy and decision making on the one side and indicator development and application over time are considered as essential features in depicting the pathways.

In Malaren's example on urban sustainability reporting illustrated in Figure 14, the use, test and development of the indicator is depicted as a significant part closely integrated with the planning and policy process, while the use and influence could be reinforced with each cycle, or replaced with new ones, as the community is gradually improving its capacity to 'measure its way' to a sustainable future. However, neither the 'knowledge impacts' of Rich & Oh or any other potential problems involved in making the step from 'assessing' indicator performance to 'redefine goals' is considered. In short, this version of a cyclic indicator pathway seems more idealist and prescriptive than critical.

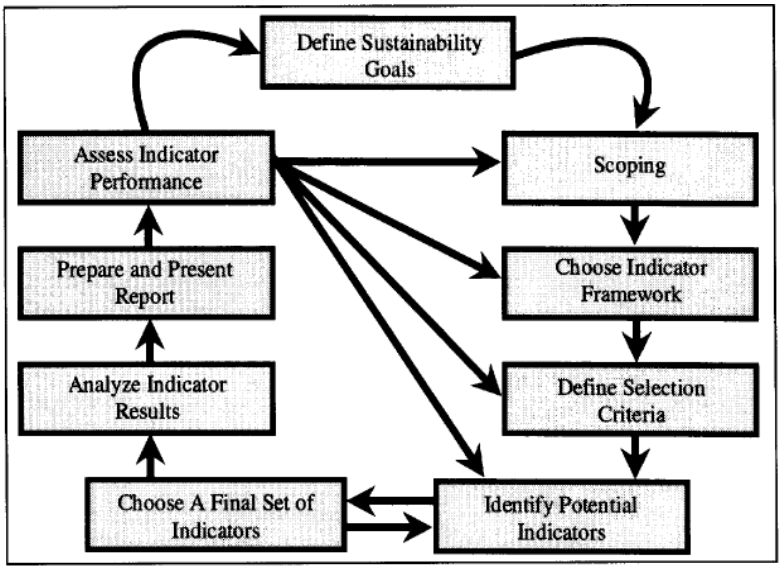

Figure 14 Indicator development cycle according to MacLaren (1996)

In contrast, Gahin et al (2003) have studied actual indicator use – beyond the production and dissemination phases - in a number of practical cases. As with Rich & Oh (2000) they were also interested in the impacts and outcomes of the indicator programs rather than simply their use. To study the impacts they defined three levels of influence called 'intangible', 'Concrete' and 'Measurable' effects. The intangibles were seen as the primary but less visible effects, which involved ones such as 'bringing people together', 'providing forum for discussion', and 'value shift's, while 'concrete' effects involves actual decisions and change of behaviour, and finally' measurable' effects which concerns actual physical outcomes, measured by indicators. According to Gahin et al it was much harder to identify 'measurable' than 'intangible' effects, partly because the short history of indicators tend to make it premature to detect wider effects; further iterations might allow for deeper impacts.

A key proposition of this research is that indicators must be coupled with ongoing actions to bring about change, for them to have any influence. The emphasis in the study is on impact of indicators *programs*, less on individual indicators. The feed-backs envisaged by Maclarens model is not explicitly addressed by Gahin et al, but discussed extensively by e.g. Holden (2008; 2006), Rydin (2003) Innes & Booher (2002); and Innes (1998).

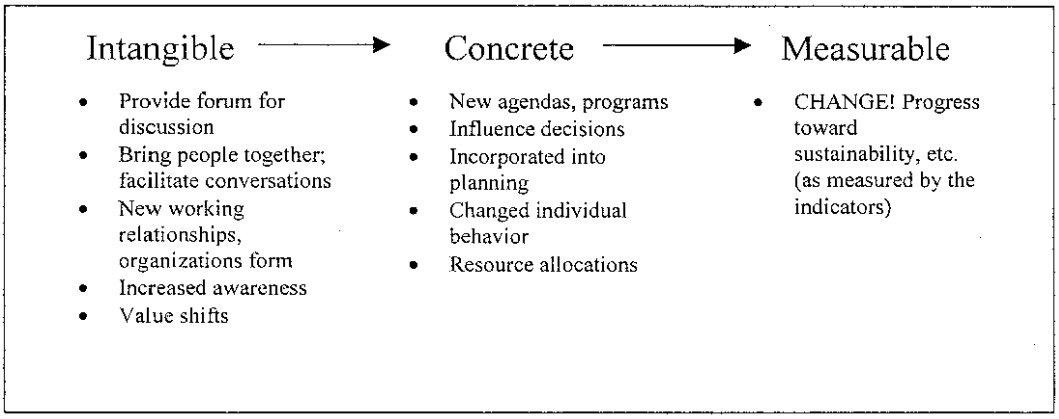

Figure 15. Main types of outcome of an indicator program (Gahin et al 2003).

While the concepts as described above by Keeble (2002) and MacLaren (1996) are simply steps in the operation of an abstract indicator application, what Gahin et al (2003) present is more in line with the idea of a 'pathway' as depicted in the initial framework of POINT; it refers to various possible policy effects or *consequences* of using indicators rather than the use as such. It is now time to zoom in on the notion of 'use' and how it may relates to these consequences.

From use to influence - Rich

Moving again from indicators back to the broader field of knowledge utilization Robert Rich (1997) critiques the whole notion of 'use' of research and knowledge as discussed above. According to Rich 'use' has become much too ambiguous a term, while it does not even encompass all the relevant aspects of how knowledge can make a difference for policy. Rich proposes to revise and extend the key terminology in the following radical way, which we quote here:

> *"'Use'* may simply mean that information has been received and read; it does not necessarily imply that information has been understood; neither does it imply that some action has been taken after the information was received and read;
>
> *'Utility'*, on the other hand, represents some user's judgment that information could be relevant or of value for some purpose which has not been identified as of yet. It also does not imply that some action has been taken;
>
> *'Influence',* (...) means that information has contributed to a decision, an action, or to a way of thinking about a problem; in this case, the user believes that by using information, he/she was aided in a decision or action; and
>
> *'Impact'* is more action-oriented. In this case, information has been received, understood, and it has led to some concrete action, even if that action is to reject the information. In this case, the information was used and it led directly to a decision or to action."
> (Rich 1997, p 15)

As we see, Rich introduces some new important distinctions in this area. Especially to separate 'use' from 'influence' in this way is essential: Just because someone uses information, does not mean it becomes influential or has any impact in a following course of events. What we are really interested in are those influences or impacts, the 'use' is merely a stepping stone, a part of what may trigger an influence. In the words of James & Jorgensen (2009) use is not necessarily the proper item to explain, but could rather be an element in understanding influence, "...the utilization of policy knowledge should be examined as an *independent variable* in the policy process, a causal factor leading to more informed policy formulation and change with increased likelihood of success" (James & Jorgensen 2009, p 143). We must agree to the idea of shifting some of the emphasis from use to influence.

However, there are several interpretations possible in Rich's model. First, it entails a distinction between occurrences in *time*, e.g. a pathway. It seems clear that influence is an event that is diachronic to use, at least in a simple model. Use *precedes* influence. It is less clear from Rich if the same is the case for 'influence' with regard to 'impact'.? What is really the distinction between the two? There is at least a difference in *intensity*; impact involves a stronger causality ('is more actions oriented'; 'information...led directly to a decision...), compared with influence, where a decision may only have been 'contributed to' or been 'aided'. But does this simply mean that

'influence' represents a weaker or more uncertain effect on events than 'impact'? 'Use' can lead to either influence, or impact, or both? Or are they all distinct steps on a pathway?

Rich himself reflects that these ambiguities have to do with fundamental problems in uncovering knowledge use processes (Rich 1997, p 16 ff.). It is simply not possible to assume direct causal input/output relations, where actions and consequences are clearly attributed to one 'piece of information', unless the set-up is an extremely simple case. Normally it is much more complex.

Rich proposes using another pathway approach in the research, with three steps:

1) information pick-up. An essential step to uncover. Involves a user.
2) information processing. The user digest, understand, test, transform the information
3) information application. Decision to use for some purpose or not.

It should not be assumed that this process from step 1 to 3 happens right away. It can take months. Non-application is also a very likely outcome. A range of methods to uncover the events are proposed, including surveys, citation (document) analysis, even lab experiments. Rich does not mention interviews. Denisov & Christoffersen (2001) find it even 'foolhearted' to trust self-reports by decision makers about how they use information, since they are rarely able to judge so themselves; instead they construct 'stories'. However, many other more recent studies have applied interviews to similar questions (Kotharia et al 2005; Peterson et al 2007; Dobrow et al 2006; Sager & Ravlum 2005; Invaer et al 2005; see also Brennin 2007).

All in all we can note that Rich introduces 'influence' as a key term and provides some basic building blocks to study it. He nevertheless abandons it again for a purely descriptive pathway of information flow. His model of a pathway is also modestly restricted to the smallest possible unit – one person, and with few steps. He does not consider wider impacts beyond the application itself, nor effects with regard to policy objectives or management. Critical aspects embodied in notions like 'symbolic use' or 'legitimisation' are not addressed.

Expanding the notion of influence - Henry & Mark

Henry and Mark (2003) (see also Mark & Henry 2004) provide an more radical critique of the 'use' concept as applied in evaluation research than Richs', and they then proceed to develop some of the dimensions we missed with Rich. First of all Henry and Mark find the parallel use of normative and descriptive meanings of 'use' highly problematic. Also, "…the idea of enlightenment or conceptual use does not provide reasonable specificity to guide measurement of evaluation's outcomes or to insure that casual observers or researchers are talking about the same outcomes." (Henry and Mark 2003, p 311).

In summary, problems with 'use', as identified by Henry and Mark, include:

- Uncomfortable multiplication of typologies of use, such as conceptual, persuasive, symbolic, process use, misuse, etc without clear boundaries,
- A focus on (intentional) 'use' constrain attention away from important unintended effects.
- The normative connotation of the term 'use' has resulted in prescriptive and generalised recommendations not always fully backed by evidence;
- Focus on 'use' draws attention to the end states, final outcomes; while often it is more important to understand the processes through which this occur

Henry and Mark suggest it is better to study the various *consequences* that may stem from evaluations, including effects such as attitude change. Hence they suggest to focus on evaluation 'influence', which they characterise as "the subset of evaluation consequences that could plausibly lead toward or away from social betterment" (Henry and Mark, 2003, 295). The real test of knowledge influence is thus if it contributes to a change in social conditions, that is, outcomes, a notoriously difficult endpoint to assess.

According to Henry & Mark influence can occur through a variety of pathways essentially taking place at three distinct levels: individual, interpersonal and collective (see also Table 8),

- *individual level*: changes in attitudes and individual behaviour. 6 subcategories of change are defined at this level (e.g. perceived salience of an issue; acquisition of new skills through the evaluation etc). The influence on this level depends on expectations, interests, informational backgrounds and worldviews of individuals;

- *interpersonal*: concerns the role of evaluations in the processes of argumentation and dialogue among actors, e.g. persuasion, legitimisation, criticism or defence, see also Valovirta (2002))

- *collective*: outcomes in terms of policy decisions and actions, shared beliefs and understandings, legitimacy of policies and actors, agenda-setting, and network formation.

According to Henry and Mark the aim should be to study those processes and what they lead to. An approach to follow pathways should be adopted; pathways of change may operate both ways – from individual to collective or vice versa. The model is

Table 8 Levels of influence with examples found in research
Adapted from Henry & Mark (2003)

Individual level	
Attitude change	Change opinion about feasibility of a program
Salience	Increase awareness about an issue
Elaboration	Stimulate new expectations
Priming	Make an issue appear more important by highlighting
Skill acquisition	Learning new ways to measure a problem
Behavior change	Adopting new practice following showing positive results
Interpersonal level	
Persuasion	More convincing argumentation via official report
Justification	Reinforcing arguments in favor of solution
Change agent	Mobilize stakeholders to actively pursue change
Minority-opinion influence	Information provides minority with decisive arguments
Social norms	Information makes new behavior seem appropriate
Collective level	
Agenda setting	Information via media brings an issue to top of agenda
Policy-oriented learning	Advocacy coalition modifies recommendations
Policy change	New policy reform adopted after growing evidence
Diffusion	Evidence of policy success stimulates adoption elsewhere

Hence, a whole new terminology for analysing the potential role of information replaces the existing 'use' vocabulary with the notion of influence layers. This corresponds well with the logic used in Gahin et al's analysis of indicator effects (see above). First of all the model enriches the notion of use-influence pathways in the 'vertical' dimension by adding the three 'parallel' levels of influence. Research could be conducted at each level, or attempts could be made to combine them. Less visible, however, but implicitly the model also extend the 'use-influence' pathways in the 'horizontal' dimension' since it would be possible, according to Henry & Mark, to start almost anywhere in the model, and chart pathways back and forth and across levels over time. In this way, they suggest, "many, many..." pathways are possible" (Henry & Mark 2003, p 307).

We agree with this shift of attention from use to influence, also as regards indicators. We also agree that the overloading of 'use' could make it almost impossible to comprehend what it means that an indicator is 'used' or not. We further accept that the consequences are more important than the use itself. However we would not abandon the notion of 'use' altogether, after having just unpicked these for indicator research quite promising varieties of non-instrumental 'uses'. Rather there is a need for reclassification along an extended pathway concept, conceived in analytic terms for indicators as we will return to shortly.

First, however regarding the definition of influence itself, Henry & Mark do not specify it much further other than by way of the typology and the restriction to 'consequences leading toward or away from social betterment'. Obviously it is also interesting to consider influences that do not lead to 'betterment', but perhaps to conflict, or failure, or distortions. In terms of the POINT project this definition seems quite restrictive, and also somewhat difficult to use as guidance for empirical research; how do we know if 'social betterment' occurs? Actually we interpret this rather as echoing an implicit call for a notion similar to 'impact' that Rich (1997) struggled with, but did not solve. There seems to be a need for a further category to allow an assessment of where all the 'influences' lead, and to what extent they really make a differences for something of significance. We can here reach back again to Gahin et al (2003), whose categories 'intangible' and 'concrete' effects match neatly against Henry & Marks 'interpersonal' and 'collective' levels effects, while the latter authors have no equivalent of Gahin et al's 'measurable' category. As regards the influence *typology* Henry & Mark have designed it for 'evaluations', another knowledge technology with a methodologically broader approach than indicators and a higher tendency for user involvement than the more 'technical' tool of indicators; it deserves a reconsideration.

All in all it seems the we need revised definitions and typologies for three notions, for use, influence, and impact of indicators respectively, and coherently. Before we set them up we will briefly review the research of Hezri, who seeks to develop and apply the evaluation influence work of Henry & Mark and others to the specific field of 'indicators'.

Linking influence to indicators and policy learning- Hezri

In line with the previous contributions Hezri observes indicators are rarely, if ever, applied in a strictly instrumental sense. Indicator 'use' is far more complex than that. In order to operationalise this complexity Hezri (2004, 2005) has developed what he refers to as a 'chain of utilisation' for sustainability indicators. At each stage the indicator becomes somehow active in a new sense.

1. Onset: indicator crosses the 'cognitive screen' of the user. "The policymakers read, digest, and understand the studies" (Hezri 2004, p 365)

2. Influence: indicators change users 'worldview'. "…If information influences the actions of policymakers (…) a real effort is therefore in place" (ibid.)

3. Acceptance: indicator influences policy outcomes. "Policy results, not inputs, are the standard here" (ibid.).

4. Impact/institutionalisation: indicator influences policy process over time

Passage through all of these steps would imply an instrumental usage of the indicator. The main problem according to Hezri is that charting a passage through steps 3 and 4 can be very difficult. Hezri also recognizes that the process may not be linear.

According to Hezri it is particularly interesting to consider indicators in the context of learning, or *policy learning*. Learning is widely recognized as the source of policy change – a key topic of interest also for POINT, since learning suggest an advanced form of policy influence. How, then can indicators become elements in a learning process? Learning is itself a many dimensional. To expect change will depend on who learns, what is learnt, and to what effect (Hezri 2006 p 100).

Hezri distinguishes between different types of learning where each step have more far reaching implications for policy change than the former.

- *Instrumental Learning*, involves 'Policy elites (policy analysts and managers, etc). The learning is about viability of policy measures and implementation

- *Governmental Learning* involves learning among State officials (senior bureaucrats and ministers). The learning is about policy processes

- *Social Learning* involves wider policy communities (including government etc). Learning is about new scope for policy or policy goal

- *Political Learning* involves coalitions of policy advocates (people from various organisation who share normative and causal beliefs). Learning how to realise ideas by transforming policy processes

In this way Hezri tries to situate the use and influence of indicators in a very broad context of societal processes at different levels of learning, involving complex pathways with multiple possible outcomes. The hierarchy is not very dissimilar in concept and intension from the four types of government performance management approaches defined by Bouckaert and Halligan (2008). Also here is envisaged as the top level a broad societal process of change and renewal, where 'knowledge' input like indicators enter as key elements supporting interaction between actors inside and outside government. In both cases this level is currently not observed, but functions as an ideal yardstick. Hezri's illustration of how policies and indicators may undergo integrated cyclical process involving learning loops is depicted in Figure 16.

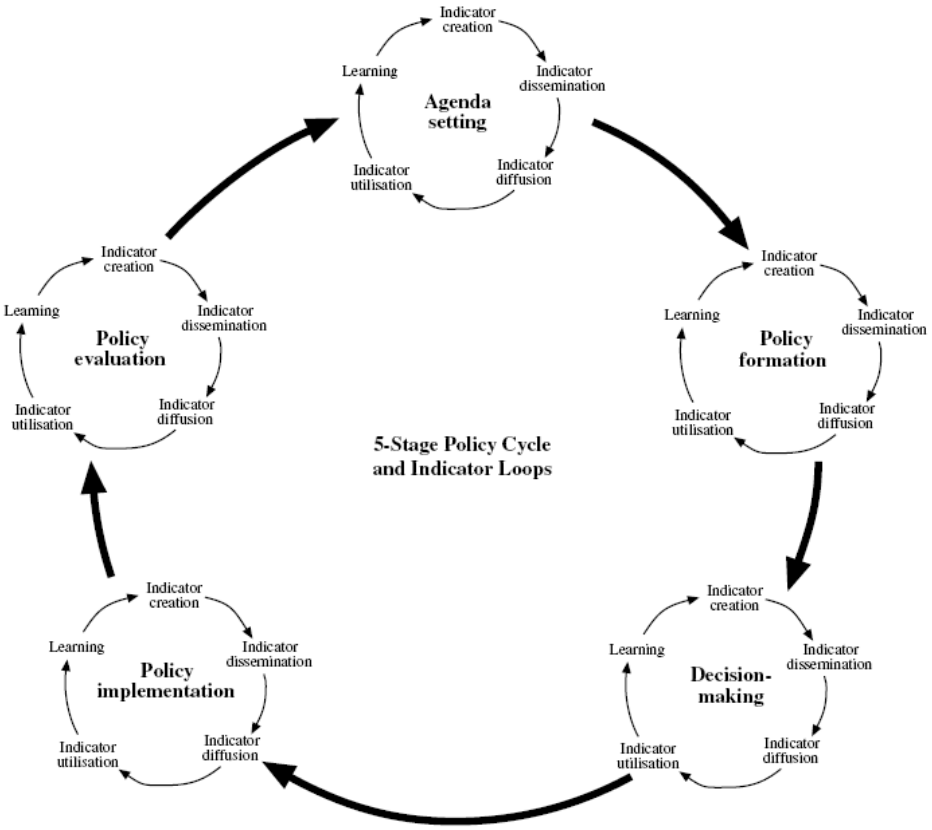

Figure 16 Indicator cycles informing policy cycles (Hezri 2005)

Hezri discusses how indicators can be brought into such learning processes and hence become used and influential. If the indicators become a part of a political learning process, they may become significant co-determinants of change. Hezri (2004) has studied a sustainable development indicator program in Malaysia, which did not evolve beyond the lower levels of instrumental learning, 'onset' and 'influence' in the first round. Later the strategy was reorganized to involve broader sets of stakeholders, which have opened new strategic opportunities towards the higher levels of indicator influence.

According to Hezri learning does not automatically lead to desired and desirable impacts, "social betterment", as asked by Henry & Mark (2003) or sustainable development in Hezri's own work. Learning may also involve processes whereby policymakers learn to better conceal data, reduce transparency or delay decisions, lobby groups learn more effective strategies to hamper and delay decision-making, etc. More effective advocacy methods are not necessarily in the interest of sustainable development. The notion of influence is thus not delimited to consequences leading towards 'social betterment' as for Henry & Mark (2003) but appears to be a more open notion, depicting indicators as potentially moving through stages of broader embeddedness, where the 'influence' stage as defined above mostly resembles the notion of 'enlightenment' use in the evaluation literature.

The universe of Hezri's work is a large and complex one, with multiple levels and long time horizons. His emphasise is mostly on effects indicator can have and roles they play in connection with policy and societal change at the macro level. A question is if this is really the most promising

perspective for analysing indicators, and if the POINT project would the context to pursue such effects. The method Hezri applies consists mainly of in-depth interviews with users and producers of indicators. Detecting the learning outcomes in such a setup seems like a methodological challenge. Still the learning perspective is interesting; it provides indicators with a perspective beyond instrumental reporting and a framework to interpret dynamics versus tranquillity in indicator sets; influential indicator systems will be emerging ones.

Yet Hezri does not abandon concepts like instrumental use of information, or indicators' possible contributions in different phases of policy cycles, as parts of smaller learning loops, and he also struggles with distinctions between use, influence and impact . Also to Hezri, 'impact' rather than 'use' suggests the main level of interest; impact is understood as stabilized influence; sustained by institutions, a level even higher than policy outcomes. Even here, as with Rich however, there is a 'first step' (called 'onset), reflecting a need to see the small beginnings, ... "The policymakers read, digest, and understand the studies"

Summary and perspective of section 5

Section 5 has first and foremost expanded on the notion of 'use' beyond the functions identified in section 4, and then all but replaced it with a notion of influence 'borrowed' from evaluation research, which is not entirely satisfactory neither in content or typology. The section has also reviewed several examples of 'pathways' considered in knowledge use and indicators literature without adopting a particular one. It is clear the large numbers of pathways are conceivable in reality, also clear that POINT is not married to a particular one, and that it would be futile to seek to prescribe any one as a 'standard'.

In this summary we will adopt solutions to those outstanding issues, and outline the structure of the research that the framework is intended to support.

The first solution is to abandon the concept of a 'pathway' and replace it with a *terminological* hierarchy, where the key concepts are organized in a logical order, and offered as part of the analytical framework to the POINT studies. Each conceptual step in the hierarchy may be examined undertaking a particular 'sub-analysis', as we shall return to, or skipped.

Meanwhile the term 'pathways' can be used for the cases of empirical study where real *interactions between policies and indicators are studied*, over shorter or longer time spans and over fewer or more interactions; they can be pathways uncovered in the empirical studies, or hypothetical pathways proposed for study based on propositions from the framework or elsewhere. These pathways can be drawn up and compared across cases using the terminological hierarchy if that will appear convenient.

The terminological logic proposed contains the principle elements 'emergence' – 'use' – 'influence' – 'impact' – role'' , although it is only partly spelled out here.

'Emergence' has not been defined before but it has become clear that the emergence of an indicator or indicator system may be a potentially influential phase in the development. Emergence refers to a stage where indicators do not yet exist as such but are conceived or otherwise materialising a part of a processes with some relation to policy making. The 'origin' can in principle take place in an entirely research or data driven context detached from policy making, but by

'emergence' we understand exactly the initial phase of interactions with policy as the 'embryonic' indicators (or framework) exist as ideas, data streams, dialogue (or pre-existing indicators being 'reborn'), that are being adopted and elaborated into a policy or policy preparatory process. One might think this as akin to the 'process' use of evaluation and research, where for example, research in collaborative projects may have an impact prior to the production of research outputs. (Boaz et al 2008); (see also Innes 1990 for accounts of emergence of indicators). We have not considered a particular typology for emergence, but the categories of data, policy, theory-driven approaches may be considered (Hanafin & Brooks, 2005; Niemeijer 2003)

The notion of 'use' is redefined as a term for immediate actions of persons or organizations, reflecting the original simple intentional meaning of 'using' something, rather than the loaded versions with multiple manifestations conceived by Weiss et al (1979) and so far juxtaposed to indicators (insights and categories gained from the previous 'use' research is instead captured in the final term in the hierarchy that of the role of the indicator)

Hence policy use of indicators is defined as:

> adoption and operation of an indicator variable, value, evaluation or framework, or variable by a person or group involved in a policy situation or process.

With inspiration from Rich (1997); Hezri (2006) and others we propose a typology of uses which to distinguishes policy use of indicators at four different levels. Each level represents a step toward more extensive use, from mere notice and observation through internal and external uses, to use (instrumentally) for decision support. Use, does only indicate possible influence, but does not assume it, and it does not follow, necessarily that the 'highest' use category (use for decision support) necessarily is the most 'influential' one. Each level is split further into two sublevels, which may be applied in research if more detail is wished for. The levels of use are shown in Table 9.

Table 9 Policy use of indicators
1. Reception
1.1 Receive, notice, observe
1.2 Forward to others (no change)
2. Internal application
2.1 For own work (calculation/text)
2.2 Use in internal communication
3. External application
3.1 Communication with other policy institutions
3.2.Communication with stakeholders
4. Decision support
4.1 Use in official policy plan/report/ document
4.2 Use for making a judgment and decision

The analysis of the use is thought of as a fairly simple and straightforward examination to chart by whom to what extent and how the indicators have been handled by the person and organisations

under study, sort of like a mapping. This is to serve as a basis for the more analytic and critical studies of influence , impact, role etc.

Next we have considered the notion of 'influence' - together with 'impact'. The distinction between those two categories have caused difficulties for all the literature contributions considered (and for ourselves). We do not have an answer to the attribution problems raised by Rich (1997), and we consider it to inherently difficult to think in terms of clear distinctions in this are, since the notions may rather be different aspects of the same phenomenon, than different ones.

Anyway to be fair to the element of process reporting on this work it can be noted that a number of ways to make the distinction were discussed. Three possible distinctions considered were the following,

> a) 'influence' as dealing with direct 'policy related' change, impact as more indirect effects of such changes, for example effects on perceptions, organisational routines, etc
>
> b) influence as a change in processes, impact as a lasting or visible effect of such processes, for example on policy results, operating practices, new concepts
>
> c) Influence as dealing with changes inside the policy process (both direct and soft, indirect), and impacts dealing with changes outside those processes in the 'sector/society/environment' (both direct and soft, indirect)

As we simply could not agree we have decided to abandon the attempt to develop 'impact'.

Partly in response *'influence'* should be defined broadly, like in

> changes to or effects on policy related processes or results at individual, interpersonal or collective levels caused by one or more indicators (variable, value, etc).

We then revisited Henry & Mark's influence typology in the context of relevance for possible influences of *indicators* (rather than evaluations for which it was designed) it and was found surprisingly fitting, at least based on the preliminary considerations before the empirical work

Only two influences from Henry & Mark were proposed to be deleted, both of which seemed very specific or unnecessary ('Elaboration' e.g. 'Stimulate new expectations'; and 'Minority-opinion influence', e.g. 'Information provides minority with decisive arguments').

Instead two new additional influences are proposed with a view to particular relevance as plausible *indicator* influences, namely 'Network building', a quite likely and commonly recognised influence in indicator processes, not addressed in the Henry and Mark framework; and 'Policy compliance verification', also a process very typical in a context where indicators may have been established exactly to control, verify (or justify) a policy against a target, leading to

The resulting revised influence typology is shown in Table 10.

Table 10 Influence typology (new)	
Individual level	
Priming	
Salience	
Skill acquisition	
Attitude change	
Behavior change	
Interpersonal level	
Persuasion	
Justification	
Change agent	
Network building	Community of indicator producers and users established
Collective level	
Agenda setting	
Policy compliance verification	Process of using indicators to verify compliance with or progress towards of a policy or program
Policy-oriented learning	
Policy change	
Diffusion	

The final category we have considered is the 'role' of the indicators.

This is allows to review the many types of influence that are not directly connected to the indicator as a functional measurement tool, but allows to consider the other, non-instrumental, political, unintended and perhaps negative indicator functions. This category, is called the 'role' if indicators as it aims to interpret, rather than to describe how an indictor works in the context of the whole process.

The role can be defined as the way an indicator informs a policy process as a whole, its contribution as a knowledge technology, rather than as a piece of information.

The role is thought of as being reserved to interpret indicators or indicator systems with reference to the terminology, and typologies hitherto associated with the 'use' concept, but criticized by Rich (1997) and Henry & Mark (2003) as previously mentioned. Hence it is an important category to allow a critical perspective on indicators and their influence.

It is placed at a 'deep' end of the logic, not because nothing more can happen or change after a 'roles' have been determined, but because this step involves more interpretation, and could be considered as a final (but of course 'optional') analysis of an indicator pathway

A typology is suggested in **Table 11**.

Table 11 Types of roles of indicators	
Instrumental role	Indicators helping to perform intended policy function in a way that confirms the indicator as a tool for problem solving
Conceptual role	Indicators contributing to expand knowledge base and introduce new ideas or concept in policy
Political Role	Indicators serving to justify decisions already taken or to improve someone's relative position in a policy processes or systems compared to 'opponents'
Process Role	Indicator conceptualisation or production process contributing to policy making
Distortive Role	Indicator confusing or derailing policy process because of wrong, insufficient or biased information, or because of induced strategic behavior, gaming etc

This concludes the tentative proposals concerning concepts and typologies for characterising and analysing policy indicator interaction pathways.

It is important to note that the definitions are suggestions only, and especially that the typologies are intended as support to identify, interpret and categorise research findings, and not as exhaustive lists or straightjackets to be bound by. It is entirely possible that the research will lead other types and relations and pathways than the ones suggested here.

6. Drivers and factors of influence

The reviewed literature provides a wide array of perspectives on why indicators might be used, become influential, have an impact, and play a role – or not - and similarly also a great number of different 'factors' that might be looked for or brought in to explain any of those occurrences or lack of them. The contributions are so diverse in scope and scale that even to find a reasonably consistent way to discuss them is a challenge

Hence, contributions could be discussed according to their general *paradigm of explanation* (e.g. 'rational-positivist', versus 'discursive-contructivist-institutionalist' contributions, Boulanger 2007)), according to their *position of observation* ('knowledge from the policy research side', like with Sabatier (1987), versus 'policy from the from the knowledge research side', as with Innes 1990), according to the particular *knowledge technology* studied (such as 'scientific information', 'evaluations', 'assessments', 'indicators'), according to more specific *applications* of these technologies (for information, for monitoring, for control, for accountability). according to *stages of the pathways* considered ('origin', 'use', 'influence', 'role' of the knowledge technology, or the whole works like with Beyer & Trice 1982); according to *level of entity or activity* studied ('individual', 'organization', 'policy process,', 'societal development', or again, the whole landscape as with Hezri 2006), according to *geographic or governance level* (local, regional, national, EU, or 'multilevel' (Rydin 2007b), according to *sector* (knowledge technology use in transport, agriculture, energy, environment, sustainability, general...), and probably in several other ways than these.

Each angle tends to emphasise different factors of importance, or different ways to conceptualize similar factors; and all of them may be right in some 'context' (Rydin 2007c, p 612; Kennerley & Neely 2002, p 1224), whatever that amounts to in such a diverse universe. Interesting contributions from the perspective of POINT can be found across the different level and fields of study, closer to as well as more remote from the particular field of 'indicators in policy'. Some refer to general conditions for infusion of 'knowledge' to processes of societal or policy change, others are focussed on particular 'knowledge technologies' in various levels or phases or sectors of policy making, while others again are occupied specifically with the use of indicators for, say, making policy objectives operational. On a broad note, however, the literature suggests that obvious major changes to policies are not likely to be found as a result of any 'indicators' since such changes are likely to be conditioned by much more complex sets of interacting factors, forces and co-incidences. Influences are more likely detected by considering the particular indicator in a specific context of use and application in detail.

What we will do in this section is simply to introduce briefly those contributions we have found particularly interesting, fruitful or provocative, either one by one or in groups with similar orientations, according to some of the above dimensions.

The *selection* of references is obviously guided by the main POINT occupations, with *indicators* (but allowing a wider appreciation of knowledge technologies) with their *influence* (but extending to use and impact), with 'collective policy processes' (but extending to organizations and individuals), and with areas where environmental protection and sustainability are issues, (although these are not at all exclusive criteria).

The *organization and presentation* of references is guided by our initial framework model, where factors related to indicators, users, and policies were set-up. We feel broadly confirmed that these

groups represent a reasonably applicable way to distinguish between factors as discussed in literature, and also that the groups together can cover the most significant factors addressed, with some modifications. For example, in her literature review of 'knowledge utilization' Rebecca Romsdahl summarises two widely held, as she posits, competing hypotheses, one that "....focuses on the characteristics of the information: if the information is "relevant, timely, and comprehensible, it will be used" ... and the second that "...focuses on organizational or bureaucratic factors, suggesting, for instance, that information will be used when the rewards and incentives of the organizational structure encourage its use (...) or when it is "...consistent with the ideology and interests of the organization. " (Romsdahl 2005, p 141). To us these sets of hypotheses need not be 'competing' but may each contribute interesting propositions for research. Bowen & Zwi (2005) in their analysis of capacity for evidence use in the health sector similarly summarize the importance of "...expertise and resources at individual, organizational, and system levels for the production and application of new knowledge to health problems (Bowen & Zwi 2005, p e-166), in addition to the quality of the evidence itself.

We begin the review the same order place as in the framework, and as in the previous chapters, namely with 'knowledge technology' and 'indicator factors', first in their more instrumental capacities, then introducing broader ideas about indicator influences, moving into users, organisation and performance measurement, and ending up with policy frameworks.

Along the way we will summarize observations and propositions.

Indicator factors

By 'indicator factors' we refer to studies that emphasize implications of how the 'knowledge technology' itself is devised, designed, applied and appreciated. It seems obvious that the use and influence of indicators or other knowledge concepts cannot be understood completely independent of what constitution that have, or at least how they are defined, discussed and referred to. However it is not obvious what the 'technology characteristics' suggest in term of potential use or influence.

As noted previously, the main body of indicator literature is occupied with the instrumental and directly communicative aspects of indicators, that is, how they function as measurement and decision support instruments for a variety of information based policy functions.

In measurement and signal theories the critical general capacity of an indicator is the ability to *represent* exactly the entity it is indicating. There are inherently instrumental aspects to indicators in this respect, in the sense of allowing a distinction between two different states of a system. If the indicator does not allow any such distinctions it is technically meaningless. Usually something in between is the case in practice. "A perfect signal produces only hits and true negatives, but in a noisy environment, a perfect signal is impossible "Rice 2003, p 235). A considerable literature exists, which specifies and applies quality criteria to assess technical representativity of indictors. Among the most widely considered criteria are the following, here cited in plain language from a World Health Organization report (WHO 2006, p 63),

"• Valid. An indicator must actually measure the issue or factor it is supposed to measure.

• Reliable. An indicator must give the same value if its measurement were repeated in the same way on the same population and at almost the same time.

• Sensitive. An indicator must be able to reveal important changes in the factor of interest.

• Specific. An indicator must reflect only changes in the issue or factor under consideration."

For each criterion a number of tests can be applied to assess or score candidate indicators. From a simple instrumental viewpoint indicators with high performance in terms of representative qualities would be the ones most likely to progress through the use-influence-impact pathways (Majchrzak, cited in Romsdahl 2005). This is not entirely implausible for some indicator applications based on scientific assessment of indicators (e.g. Rice & Rochet 2005), since these assessments would tend to filter out non-performing indicators from further consideration (Kurtz et al 2001). However it is rarely the case that scientific assessment alone control indicator sets applied in policy. Conventionally applications and other practical concerns need to be addressed using other assessment criteria such as 'policy relevance' (relevance for specified policy objectives), ''data availability' (cost and logistical concerns), 'timeliness' (time lag between measurement and results' and 'understandability' (WHO 2006; OECD 2003; NCHOD 2005). The most comprehensive overview of 'indicator criteria' in the area of environment is given by Niemeijer & de Groot (2008).

While indicators can be, and frequently are scored according to such quality criteria, and these exercises often are awarded considerable prominence, there seems to be few studies that seek to actually predict or evaluate use, influence of impact directly based on 'indicator quality' or technical performance. This may have to do with sometimes limited consensus in practice about the scores, even among experts or peers (Rochet & Rice 2005; Dobrow et al 2006). Rosenström & Lyytimäki (2006) studied the practical criterion of timeliness for a series of environment indicator reports, and found it to be generally low, and non-improving; however, they did not assess the effects on use or influence. In the area of performance measurement. Mausolff & Spence (2008) assessed the impact of the quality of organizational performance management system on performance of organizations in the non-profit sector using structural equation modelling, and found that there was a strong correlation between the quality of the system as reported by evaluation teams and improved performance of the organisations. However, the study did not reveal individual quality factors. 'Organizational learning' effects was however identified as one contributing factor. In a review of reports in the area of evaluation research, Sandison posits that "'if the quality is poor, data dubious, and recommendations irrelevant, it is perfectly rational not to utilise an evaluation." (Sandison 2005, p 105). However, more frequently it have been aspects such as "excessive length

Table 12 . Niemeijer & de Groot (2008) Criteria for selecting environmental indicator sets.

Analytically soundness	Strong scientific and conceptual basis
Credible	Scientifically credible
Integrative	The full suit of indicators should cover key aspects/components/gradients
General importance	Bear on a fundamental process or widespread change
Historical record	Existing historical record of comparative data
Reliability	Proven track record
Anticipatory	Signify an impending change in key characteristics of the system
Predictable	Respond in a predictable manner to changes and stresses
Robustness	Be relatively insensitive to expected source of interference
Sensitive to stresses	Sensitive to stresses on the system
Space-bound	Sensitive to changes in space
Time-bound	Sensitive to changes within policy time frames
Uncertainty about level	High uncertainty about the level of the indicator means we can gain something from studying it
Measurability	Measurable in qualitative or quantitative terms
Portability	Be repeatable and reproducible in different contexts
Specificity	Clearly and unambiguously defined
Statistical properties	Have excellent statistical properties that allow unambiguous interpretation
Universality	Applicable to many areas, situations, and scales

Costs, benefits and cost-effectiveness	Benefits of the information provided by the indicator should outweigh costs of usage
Data requirements and availability	Manageable data requirements (collection) or good availability of existing data
Necessary skills	Not require excessive data collection skills
Operationally simplicity	Simple to measure, manage and analyze
Resource demand	Achievable in terms of the available resources
Time demand	Achievable in the available time
Comprehensible	Simply and easily understood by target audience
International compatibility	Be compatible with indicators developed and used in other regions
Linkable to societal dimension	Linkable to socio-economic developments and societal indicators
Links with management	Well established links with specific management practice or interventions
Progress towards targets	Links to quantitative or qualitative targets set in policy documents
Quantified	Information should be quantified in such a way that it significance is apparent
Relevance	Relevance for the issue and target audience at hand
Spatial and temporal scales of applicability	Provide information at the right spatial and temporal scales
Thresholds	Thresholds that can be used to determine when to take action
User-driven	User-driven to be relevant to target-audience

and inaccessible language," (ibid.) in reports that are cited as limits to use and influence. Seck & Phillips generally suggests that research "... that is free of faults in design, method and interpretation is more useful because it is more likely to lead to intrinsically good policy options." (Seck and Phillips, 2001, cited in Neilson 2001, p 40), but do not make empirical observations in these regards. In contrast, Landry et al, in a large scale study of the utilization of scientific research results among Canadian government agencies, found no evidence that utilization could be explained by research characteristics or by on focus on the advancement of scholarly knowledge (Landry et al 2003). Factors related to the users own engagement with the research seemed more important. Bougherara and colleagues in a study of environmental regulation even found that in some circumstances, with limited capacity to absorb and digest information "... beyond an optimum level, an additional information load, regardless of the information quality, could do more harm than good." (Bougherara et al 2007, p 197). An example given is the area of eco-labelling, where consumers did not feel better informed with more and more labels.

Summing up its seems highly appropriate to ask how the qualities of indicators will influence use, influence or impact of indicators. Even if the literature does not provide much basis for generating hypotheses in this regard, it seems worth investigating what relations can be found between either technical, measurement related qualities (e.g. demonstrated validity, reliability), or use and application related qualities (e.g. timeliness, policy relevance) and the indicator use. This will best be explored in areas where indicators that have been systematically assessed are in use. Interviewees could for example be asked about their awareness of, interest in, or consideration of indicator quality and relevance criteria. Attention should be given to other factors (like imposed use, or user involvement in the assessment process) that could weaken the link.

A proposition could be the following:

(P/Q4) Indicator users in scientific positions are more in favour of using indicators that have scored well on technical quality criteria, than indcators that have scored well on application related criteria; the opposite the case for indicator users in policy making position. Indicators with significant degree of contestation are not much used or directly influential;

We will therefore shift to some of the broader considerations of indicator factors and looking in a bit more detail on two contributions, namely from Judith Innes specifically in indicators and from Cash et al on broader knowledge use in comprehensive assessments.

Innes has been a pioneer in the application of critical, social science and knowledge research to the indicators field, as reported in Innes (1990; 1998) and Innes, & Booher (2000). Innes (1990) provided thorough empirical accounts of how a number of key social indicators were developed and applied in policy making in the USA over an extended number of years. Based on the studies a typology of factors is devised, which according to Innes could provide building blocks to explain successful use and influence of systematic information tools like indicators. The suggested factors can be summarized as follows:

- *Conceptual* aspects, referring to whether there is a clear conceptual model for how the indicator describes the part of reality it deals with. For example whether models used provide sufficiently accurate representations of a particular system
- *Data collection* aspects; whether for example accurate and appropriate data sources are available and used
- *Data structuring or communication* aspects; how the indicators are constructed, aggregated, and presented; their validity and sensitivity to changes
- *Institutionalization* aspects, the degree to which the indicators are backed by proper production systems and thereby can persist over a longer period of policy development. (Innes 1990, as adjusted by Gudmundsson et al, 2009)

As Innes puts the latter point: "institutionalization in this context means the setting up of procedures and practices which ensure the continuing existence of an indicator and which legitimize and formalize its methods and concepts" (Innes 1990, p 232)

The factors refer primarily to aspects of the 'indicator technology', but incorporates wider elements, belonging to what we have called the frameworks. Especially the consideration of the institutional aspects, the legitimacy obtained through logistical arrangements etc contributes to extend the focus on the quality of individual knowledge items.

In her later work Innes emphasizes the need to move further beyond the instrumental perspective in order to understand properly the prospect of influential indicators. A successful outcome of an indicator program will usually take time and involve a gradually emerging common construction process within a group of (possibly oppositional) policy actors, actively involved in processes of conceptualisation and definition of indicators along with shaping the policy field. The indicator's effectiveness cannot be understood independently of the wider communicative policy process that render it legitimate, hence the same cannot be achieved by for example letting external experts produce and deliver neutral 'high quality' information. It is the 'shared understanding' (Innes 1998, p 56) obtained through critical elaboration and gradual acceptance, that makes the information accepted.

(P/Q5) Indicators are more likely to be used or promoted the more they are percievd to perform well on all four of the dimensions proposed by Innes, conceptual, operational, structural and institutional.

Cash et al (2003; 2002) have followed a similar vein of research, and they establish a more operational framework for analysis of knowledge Cash and colleagues were intrigued by observing

the limited degree to which results of several major environmental research programs (such as the Global Biodiversity Assessment) succeeded in providing useful information for policy making. 'Boundaries' seems to exist between the realms of policy and science, which hinder the full acceptance by one realm of knowledge produced in the other. Multiple such boundaries exist (between jurisdictions, cultures, scientific disciplines etc). The 'boundaries' are seen as a major obstacle for advancing the linkages between science and decision making, but they are not considered impenetrable.

The emphasis in the work by Cash et al has been to identify and analyse the factors that bar (or help) knowledge to become accepted simultaneously across several boundaries. Cash et al highlight three such factors, 'Salience', 'Credibility' and 'Legitimacy' (S,C,L). The concepts are defined, as follows:

> "*Salience* refers to the relevance of information for an actor's decision choices, or for the choices that affect a given stakeholder"
> **"***Credibility* refers to whether an actor perceives information as meeting standards of scientific plausibility and technical adequacy. Sources of knowledge must be deemed trustworthy and/or believable"
> "*Legitimacy* refers to whether an actor perceives the process in a system as unbiased and meeting standards of political and procedural fairness. (…)Audiences judge legitimacy based on who participated and who did not, the processes for making those choices, and how information is produced, vetted, and disseminated."
> (Cash et al 2002 p 4-5)

According to Cash et al the main focus in environmental knowledge research has so far been pointed to the 'credibility' factor, comparable to the focus on 'data quality' above. Efforts have been made to secure the credibility of scientific information, in the hope that this would make it readily accepted by policy makers. Meanwhile it has been overlooked that just as often the barriers are associated with limited relevance (salience) of information produced by scientists for a present decision situation; or in some cases lack of legitimacy, as for example when global climate research was perceived as 'biased' by developing countries, as, ate least up to a point, only western scientists were involved (even in the 'credibility' factor was high).

For Cash et al the main task for the empirical research is to examine how acceptance or rejection of research results in each case is influenced by differences in what is considered as salient, credible and legitimate information on each side of the boundaries. The aim should be find ways to manage the information so levels of S,C,L that are sufficient for actors on all sides of the boundaries to accept it .

To sum up, both Innes and Cash et al emphasize the need for 'knowledge technology' to become accepted and be perceived as legitimate, as crucial elements beyond mere technical credibility. The two are not substitutes, but complementary, it seems. More over they both emphasize processes that lead to a situation where legitimacy is obtained as crucial. Especially Innes makes it clear that this will require a perspective on indicators that step behind or before the finished product, the indicator, or indicator set, and considers its genesis and history, as part of a social communicative process. *The influence seems to depend entirely on the emergence*, and the associated 'learning process' in Innes perspective, while this could be more open with Cash et al.

Operational research questions could for example be based on combining Innes previous 'four factors', with the adoption of the perspective of perceived legitimacy etc of both Innes and Cash et

al, asking: to what extent do key policy users/makers, on various sides of the 'boundaries' suggested by Cash et al see the conceptual, operational, communicative and institutional aspects of particular indicators (or frameworks) influence the salience, credibility and legitimacy they perceive of them, and how do those perceptions affect their willingness to consider and use the indicators? It could for example be proposed that the way each of the four 'Innes factors' connect to the three 'Cash' dimensions depend on the involvement in the 'history' of a particular indicator.

It might be useful also to incorporate specifically the different sets of indicator quality criteria discussed above (technical and policy oriented) in this context, to verify if perceived 'credibility' is for example more connected to technical criteria, while 'salience' adhere to the policy oriented criteria; and further if 'legitimacy' fits somehow into the scheme of criteria.

It can be noted that the knowledge technologies and indicators discussed by Innes and Cash et al seem to be predominantly of the 'system' types, while they do not address explicitly more performance oriented management frameworks, nor indicator systems that to a higher degree are based in legislative frameworks. It might be the case that the significance of – or opportunity – for consensual processes or deep stakeholder involvement' would be different in such cases for the possible pathways of influence. Also their work points to a need for focussing on how to characterize participants or 'users', since the differences of perspective they represent are so crucial for their accounts.

(P/Q6) Indicators that are generally considered to be salient, credible and legitimate are used or promoted more than indicators that are not. What defines the 'boundaries' in each case of indicator use? Is the distinction between 'scientists' and 'policy makers' the most important one, or are there more sector or context specific distinctions?

User factors

By 'user factors' we are considering the perceptions, capacities and positions of people involved in indicator and policy interface processes. The users may be addressed as unique individuals, but more importantly also as participants in organisations, networks and institutions where they function as agents in processes spanning the individual, interpersonal and collective levels suggested by Henry & Mark (2003).

Evaluation research is an area that has paid particular attention to users, since 'use' and usefulness are so deeply embedded aspects of the evaluation discipline (Spiel 2001). A concept that is appropriate for describing these 'user factors brings together actors' expectations, belief systems (Sabatier 1987), mental models and the more operational codes and practices of organisations is 'repertoire', defined by van der Meer (1999, 390) as "stabilised ways of thinking and acting (on the individual level) or stabilised codes, operations and technology (on other levels)". Because of differences in their histories, experiences, and positions in the relations of power, actors have different repertoires, which they use in the process of sense-making and construction of behaviour. The impacts of 'knowledge technologies' such as evaluations may not primarily be determined by the logic of the experts producing them, but perhaps more by the repertoire-based interpretations and (re)actions of the agents involved. Since 'assessed' entities in a broad sense host a number of overlapping and competing repertoires, the intensity and direction of the impacts of 'assessments' may depend on the extent to which they link to the repertoires of certain individuals or factions in the organisation.

A key requirement for an evaluation to promote learning is that it links with the dominant repertoires and stimulates the development of new links between different repertoires or repertoire elements. (van der Meer 1999, 390-392.) We assume this 'repertoire-dependence' to apply to the influence of indicators – and expert knowledge more generally

(P/Q7) We propose that the following dimensions of user repertoire are important for indicator use;

- Educational background of the stakeholders; Persons with an advanced academic degree are more likely to rely on indicators in their work than those without an academic degree or with a social science degree (however, one could imagine that persons with an academic degree would also be more critical towards indicators and able to adopt a more reflexive approach to indicators than the non-academics)

- Hard vs. soft sciences – those with a degree in hard sciences are more likely to use indicators directly

- Organisations whose institutional culture (organisational 'repertoire') involves frequent use of readily measurable and quantifiable data are more susceptible to use indicators than those with a 'soft' science background (e.g. energy sector = more 'quantifiable' culture than social sectors and possibly the agriculture sector

A basic distinction in evaluation studies is made between internal and external evaluations, the former being conducted by the evaluated entity itself, usually to improve policies and their implementation, while the evaluations conducted by an independent outsider typically serve the functions of control and accountability. Similarly, indicators designed by the entity itself are bound to have different impacts and role in policymaking than those imposed from the outside. Studies from evaluation research suggest that internal sources are perceived as more legitimate and salient by the evaluated entity (Oh, 1997; Van der Meer, 1999).
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As mentioned the involvement of stakeholders in the evaluation process is generally considered as a necessary, yet not alone a sufficient condition for influential evaluations (see e.g. Patton 1997a; 1998; Baron 1999; Eckley 2001; Weiss 1998; Torres et al. 1997; Patton 1997a, 87-113) as well as for sustained policy results and empowerment in development projects in general (e.g. Lyons et al. 2001).

Advantages and *downsides* of participatory designs are likely to apply to indicator design, as well. Evaluation research here presents useful counterbalances to the strong 'participatory optimism' ascribed to Innes' above.

The impacts of participatory processes are crucially shaped by their design on the one hand, and by the broader societal conditions – in particular, the relations of power. Participatory, deliberative institutions are not immune to capture by influential groups, especially in situations involving large asymmetries of power between participants. Problems of participatory and deliberative methods can be summarised under the following main headings (Baron, 1999, pp. 127-132; Eckley, 2001; Gambetta, 1998; Henry & Mark, 2003; Hisschemöller, Tol, & Vellinga, 2001, pp. 63-64; McKie, 2003, p. 309; O'Neill, 2001; Parkinson, 2001; Sager, 2001, p. 210):

- Well-designed participatory processes require considerable time and resources and may thus be perceived as an unnecessary burden slowing down the execution of policies.

- In a context in which weaker groups do not have the resources, capacities, and knowledge to participate on an equal footing with experts and powerful groups, a false image of participation on equal terms may emerge.

- A lack of competence of participants may weaken the quality of the outcome; although broad participation tends to enhance the legitimacy of the product (in our case, legitimacy of the indicators), its credibility may be compromised if the process thus becomes too 'politicised'.

- Participatory processes may be inherently conservative, as parties seek consensus around the lowest common denominator. For the same reason, the most critical perspectives tend to be excluded.

- Policymakers, civil servants and experts involved can be reluctant to relinquish control of the process, including the collection of data and information.

In summary, while participation of stakeholders can be considered as a necessary condition for influential indicators, the success of participatory processes crucially depends on the political context – the relations between the 'users' of indicators and the general policy setting – which shall be dealt with in the following.

(P/Q8) Based on the review of user factors we can make the following further propositions for the research:

- Indicators designed by the organisation in question are likely to be more influential than 'external' indicators.

- Broad participation of stakeholders in indicator design enhances the potential of the intended use of the indicators, but Lack of or poorly designed participation tends to reinforce resistance against the use of indicators, thus reducing their direct influence.

Policy factors

The notion of 'policy' as a driving or conditioning factor behind indicator use and influence is an important but complicated one. One dictionary defines public 'policy' as a "high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body", while, Hogwood & Gunn (1984) identifies at least 10 different widespread meanings of the term 'policy', ranging from general purpose to specific proposals. A clear definition of public policy is difficult to make, also since boundaries between public and private sectors have become blurred, and a multitude of actors and institutions are typically involved in the policy processes (Propper & Wilson 2003). This represent just one challenge for defining clear cut 'public policy functions' of indicators. Another challenge is the multitude of paradigms which exist in the area of political science and policy studies in general and the different conditions for 'knowledge' use (not to say indicators) in policy each of them implies (James & Jorgenson 2008). Two approaches that allows some analytical space to consider this will be briefly be exemplified.

According to Paul Sabatier the most useful unit of analysis for understanding the policy process is not any specific governmental organization or program but rather what he calls a *policy subsystem* or *domain* (Sabatier 1998, p 99 ff). A subsystem involves actors from a range of both public and private organizations who have a focus on a policy problem or issue, such as organic farming, or urban transport, and who regularly seek to influence 'public policy' in that domain. Each domain may contain one or more competing 'advocacy-coalitions' with different interests and worldviews. Knowledge is a key part of the coalitions, where the most constitutive knowledge is called 'core beliefs'. The core beliefs rarely change. In this approach indicators could for example be analysed from the perspective of how they conform with or dissent from the core beliefs of identified 'advocacy-coalitions' and what their strategies towards such indicators have been. However, the approach has be criticised for being to insensitive to more subtle workings of information as it has its focus on major policy change (James & Jorgensen 2008). In term of short-term policy change factors , Sabatier has his focus elsewhere (Sabatier, 1987):

- changes in socio-economic conditions and technology (e.g. the oil crises, innovations in new information technology or pollution abatement technology);
- changes in systemic governing coalitions (left and right wing governments tend to have different policy approaches in environmental matters, for instance); and
- Policy decisions and impacts from other subsystems (e.g. European harmonisation, which has brought about greater reliance on the principles of the free market).

Following *Kingdon* (1984, see also Zahariadis 1999), it is most useful to consider public policy making as three independent streams, a problem stream, a policy stream, and a politics stream. These streams develop along their own trajectories, which means that policy also in this perspective rarely changes beyond small incremental steps. When the streams do met, a 'window of opportunity' opens for policy entrepreneurs to craft new solutions to send policy in a new direction. In this model indicators are explicitly considered as playing a potential role in the 'problem' stream, however. Indicators are here a source for policy makers to identify conditions that can be depicted as problems that need to be addressed, like for example highway fatalities. Indicators can be monitored either routinely or through special studies. Indicators are one of three general sources to identify problems, the other being dramatic events and feed-back from existing program (which by the way could also utilize indicators, it seems). More importantly, the indicators will not become influential, unless the problems they describe, are matched with appropriately fitting policy ideas on the one side, and a favourable political environment on the other, including the configuration of the so-called 'national mood' In general it will be hard to predict when policies can shift in such a setup (and genuine indicator influence might occur), but it seems possible to retrospectively study cases where this has or has not taken place; However such cases are not on the research agenda in POINT

Both approaches invite to rather comprehensive studies of particular policy situations, while they do not establish vocabularies or other guidance specific to the study of indicators, although Kingdon's model admittedly considers at least some aspects of it. We do not suggest to build any propositions on them, even if they are generally interesting.

Other scholars contribute more in this regard. The *level of development of the administrative machinery* in the policy area, the fundamental *cultural values* and *social structure*, *political culture* and the policy style in a country are among the possible explanatory factors the use and influence of indicators . Among the latter, Weiss (1999, 480-482) refers to a 'culture of rationality', while Gambetta (1998) has analysed the importance of 'discussion culture', distinguishing between

'analytic' and 'holistic' cultures, the former being more conducive to deliberative processes and the use of expert knowledge in policymaking.

(P/Q9) Weiss (1999, p 480) posits a high degree of decentralisation of policymaking encourage the use of research and evaluation for policy-making, given the greater openness of such systems to evidence and argument. The degree of development of policies, institutionalisation of environmental concerns into administrative structures, and environmental policy integration are likely to be crucial. Likewise, the independence of *the media*, as well as the strength and the status of the NGOs and the *civil society* in general tend to promote critical discussion in society, thereby potentially increasing the influence of evaluations. (Weiss, 1999) A task for POINT could be to investigate the importance of these factors and test the validity of Weiss's assumptions for indicators.

Since indicators are normally used as part of broader policy processes – be that policy planning, monitoring, evaluation or assessment – the nature of the policy process in question is important. When indicators are used as part of an evaluation, the scope and focus of this evaluation exercise becomes crucial. Narrow focus has been found to enhance an evaluation's credibility, because the evaluators are likely to be experts in their (narrow) subject area. On the other hand, a narrowly focused evaluation is likely to be less salient to broader audiences, and runs the risk of losing legitimacy among experts and stakeholders from outside of the subject area. (Eckley, 2001; Lang, 2001)

Another key factor relates to the *criteria used for judging policy success*. In evaluation studies, two broad categories can be distinguished: the goal-achievement model – which analyses the degree to which a policy has reached its own objectives – and evaluations that apply various criteria external to the policy in question. Such criteria may include relevance of the policy in relation to the needs; impacts; sustainability or persistence of outcomes; flexibility; predictability; efficiency; effectiveness of the administrative processes; legitimacy; transparency; equity; or changes in knowledge, attitudes and behaviour of the target groups of the policy (Roman and Vedung, 2000; Ahonen, 2001; Vedung, 2001). Many of the external criteria are difficult to quantify and translate into indicator language.

(P/Q10) A relevant question concerns the potential negative impacts of indicators notably 'goal displacement' (Patton, 1998; Perrin, 1998; Perrin, 2002): to what extent does the nature of indicators as seemingly objective, usually quantified information steer attention in evaluations and assessments to the measurable, away from what might be more relevant? And, as a factor explaining indicator influence, to what degree do easily quantifiable indicators, typically measuring the achievement of clearly defined targets, have greater policy influence than e.g. process indicators?

Finally, the *character of the issues* addressed is of importance. Influence is likely to be greater on consensual issues of 'professional' character, and issues that have been highly institutionalised in the decision-making process (Weiss, 1999; Leknes, 2001; Beyeler, 2002). However, evaluations emanating from a source considered reliable have been found helpful in building consensus even on highly controversial topics (Schubert et al., 2000). A theme for empirical research in POINT would be to explore to what extent indicators indeed serve such a consensus-building function on issues of significant controversy. In general, one of the alleged benefits of indicators is their ability to provide focus and enhance shared understanding e.g. around the goals of an organisation (e.g. Van Der Knaap, 2006).

Earlier research into the role of scientific and expert knowledge in policymaking has underlined the importance of two factors relating to the character of the issues in question: the degree of scientific uncertainty and the extent of value consensus. Pielke Jr. (2007) has argued that, depending on these characteristics, an expert could act on a given policy issue as a pure scientist, policy arbiter, issue advocate, or honest broker of policy alternatives. These roles represent different combinations of perceptions concerning democracy on the one hand, and the relationships between of science and society on the other. Consequently, the role of indicators would vary depending on the role of expert in the policy process. One would expect indicators to be more readily usable as direct inputs into policy processes on issues entailing little scientific uncertainty and broad value consensus. On controversial issues, when participants disagree on values and goals, indicators that seek to narrow down the range of policy options would have more chance of being influential. Instead, in such situations indicators should seek to open up the range of policy options, and help illustrate the issues in question from various alternative perspectives. Indicators would in such contexts be more likely to foster learning and building of shared understandings.

Hence, Pielke Jr.'s ideas are close to those of Stirling (2008), as an 'honest broker' could be perceived as an expert that provides policy advice aimed at 'opening up' both the inputs into the policy appraisal process (e.g. bringing in different epistemic and normative views) and the range of policy options (policy recommendations presented as alternative scenarios, rather than as a single 'best' option). An 'issue advocate', in turn, would reduce the range of choices ('closing down') in a decision-making situation. Both processes have their role in decision-making, depending on the nature of the policy problem in question. Traditional methods of expert appraisal, such as cost-benefit analysis, risk analysis and multi-criteria appraisal are based on the desire to narrow down the scope of policy options, and – ultimately – present the policymaker with a single, unitary 'best' option. The types and the degree of influence of indicators are likely to depend crucially on the nature of the policy processes within which they are employed.

Finally, in a similar vein, Hukkinen (2008) has argued that a given indicator or indicator set only makes sense within the framework of a scenario, entailing a description of the desirable state in the future and a pathway to that desirable future state. Any indicator set is base on an implicit or explicit scenario of a desirable future. Given that many, if not most decision-making situations concerning the environment and sustainable development entail high uncertainties of the scientific facts and an absence of consensus on both the facts and values (goals & objectives), the influence of an indicator set comes to depend on the degree to which they integrate such uncertainty and conflict of views.

In summary, the influence of indicators is shaped by the role they are given in a policymaking situation, and, arguably, lack of policy influence can stem from an appropriate assessment of the character of the problem at hand. In questions relating to sustainability, such deficiencies typically include the failure to account for the complexity of issues – the scientific uncertainty, absence of value consensus. In many situations, 'opening up' the range of policy options is a more appropriate objective for indicator use than search for 'closing down' through narrowing down the policy options.

(P/Q11) We will make the following propositions; Indicators that measure issues in a narrowly focused policy area, applying methods and measures specific to that area, are more credible but less legitimate than indicators covering cross-sectoral issues; The use of quantitative indicators tends to steer attention towards issues measured/measurable with those indicators, away from topics deemed to be of strategic importance to the organisation in question.

7. Summary: Analytical scheme and guidelines for the work

This report has first described the process of establishing an analytical framework for POINT through an extensive literature review and an expert consultation, and has then proceeded through a series of steps to build up concepts, variables, typologies, and possible explanans from various branches of research, notably broad fields of indicators research, evaluation research, knowledge utilisation research, political and administrative science, and literature on environmental and sustainability assessments in particular.

The outcome is a menu of contributions to understand the interrelations between indicator systems, knowledge use and policy processes organized into three major bodies of chapter 4 (indicators), 5 (knowledge use) and 6 (explanatory factors from theories). From this knowledge it is clear that the use and influence of indicators in policy is a multidimensional subject, considering the many varieties of indicators, the many policy functions they can serve, and the several ways that knowledge can be 'used'. No question that many indicators are 'used', but understanding the full implications of that leads to will require considerable work.

It is also clear that POINT now stands much better informed about the challenges and opportunities involved in its work, to mention a few key points.

- awareness of indicators as one among multiple sources of policy information; attention to distinguish the role of one source from others
- awareness of information use is intangible and difficult to detect, the conceptual complexity involved in disentangling use, influence, impact etc of information
- multitudes of ways to use knowledge; awareness that information is not redundant if not used in prescribed ways; indicators as potential sources of misinformation; information overload,
- the nuances of policy making, the different knowledge needs in different situations, stages and organisational settings
- the contestability and contextuality of knowledge; the boundaries, uncertainties and legitimacies
- the gap between general policy theories and the knowledge use research
- the huge conceptual distance from knowledge use at the individual level to societal learning

The primary avenue for bringing the knowledge into POINT is by way of an the analytical framework which forms around 'terminological hierarchy' or concepts with associated typologies. It is a framework , open for interpretation and application, n the sense of Ostrom, when she speaks about frameworks, not as theories or models but as concepts that organize diagnostic and prescriptive inquiry, provide general list of variables, and 'meta-theoretical language' that can be used to compare theories" (Ostrom 1999 p 39-40).

The overall proposed analytical scheme is to systematically examine cases of policy- indicator interaction using partly overlapping core concepts of 'emergence' – 'use' – 'influence' – 'impact' – 'role' and the associated typologies to gradually uncover and interpret the various ways the interactions have occurred. Each conceptual step in the hierarchy can be examined undertaking a 'sub-analysis', or skipped, depending on which assumption or hypotheses is of interest in each particular case. Subsequently cases can be discussed against one another

The table below illustrates the main sub-analytic elements proposed and exemplified questions that could be pursued. The distinct steps of 'Impact' iand 'Role' are disagreed in POINT.

Table 13. Sub-analysis with examples	
Sub-analysis	**Types of questions (examples)**
Policy back-ground	What is policy and political background? Which policy institutions are involved? Are there policy strategies and targets? Is there an EU policy
Indicator/ emergence /framework analysis	What is origin of indicator/framework? What is official function of indicators? Which types of indicators/framework is it? Who are producing indicators? How and how often reported, to whom?
Use	Who has received indicators?, Used for internal purpose? Used for external purpose, use in decision making? (used for what?)
Influence	How are indicators used or applied? In which types of situations are indicators present? Examples of discussions communications etc where indicators have been a part of a process,
/mpact	More significant examples where indicators have made a difference with regard to intended targets etc, as well as unintended effects
Roles	(analytical, probably not interview questions); what are patterns in the answers to questions in the above sub-analysis with regard to instrumental, political, enlightenment roles

A number f choices have to me made. Each sub-analysis may for example be performed for,

- different indicator aspects (e.g. value, evaluation, variable, framework, or any combination),
- different extensions of the scheme (e.g. only a single step between 'use' and 'influence' or the full steps from 'emergence' to 'role' analysis)
- different assumptions and hypotheses drawing from appropriate theories

The configurations of a sub-analysis may be designed in advance, based on a particular research interest or may be applied more explicatively, as data are collected and new patterns are uncovered leading in new directions found.

indicator pathway analysis. The pathway variables are tentatively grouped in two sets, 'background analysis' and 'influence analysis'. Some of the categories are not unfolded or considered. The columns are ordered sequentially but do not have to be approached in this way.

A full set up (hardly realistic) would include the following steps:
- selection of sub analysis to conduct; formulation of hypotheses
- a policy background analysis, primarily based on documents. No guidance in document
- an indicator analysis; may either focus in depth on an 'emergence' phase (if considered interesting) or simply provide an analysis of the indicators and framework; typologies and propositions given in section 4 of the paper
- use analysis, based on documents/interviews; typology and propositions in sections 5,
- influence analysis, based on interviews, typology in section 5, propositions in 5/6

- impact analysis (typology in section 5)
- role analysis (no guidance)

Table 7 IIllustrate the full scheme more comprehensively, again with caveats for some columns.

Table 7 Analytical framework setup for charting sub- analyis

'Background' analysis			***'Influence' analysis***		
Policy background	**Emergence / function**	**Use**	**Influence**	***Impact***	***Roles***
Policy context	Origin of system	Reception	Individual	*Internal*	*Instrumental*
Policy framework	Official function/appli-cation	Internal application	Interpersonal	*External*	*Political*
Users	Types of indicators	External application	Collective		*Conceptual*
	Types of framework (e.g. system or performance); logistical aspects	Decision support			*Process*

Define type of analyssis to conduct

Formulate hypotheseis about explanatory factors at level of empirical case

For further illustration a hypothetical example is given below of sub analysis of 'indicator use ', by depicting a set of stylized 'answers' to interview questions, and how those answers could be classified in the typology. The example covers for the four aspects of indicators (value, variable, evaluation, framework), and a set of hypothetic 'answers' collected during interviews that exemplify how responses could be classified according to the cells in the scheme. One table suggest 'affirmative' answers (indication of use), the following one negative (no indication of use)

A series of similar tables is presented for POINT members for discussion, experimentation and further conceptual development at POINT project meetings, next time in November 2009.

Table 14 Hypothetical responses – Affirmative

	Value	Variable	Evaluation	Framework
RECEPTION	"We noticed the difference between the 2007 and 2008 data"	"We noted that the monitoring system now use aggregate value for all XXX"	"We took note that utility xxx now was the best performer"	"We were gladly surprised that the new report included all three dimensions"
INTERNAL APPLICATION	"We used the new 2008 data in a internal review paper"	"We decided to rebuild our database using the new aggregate"	"Internally we ranked the utilities according to the new indicator"	"We decided we needed to include the report's outcome approach in our internal work"
EXTERNAL APPLICATION	"We sent out a report using the new 2008 data"	"Our new official forecast used the new aggregate to present results"	"In our 2008 annual report we used the indicators' top 5 utilities as cases"	"We adopted the 'three capital' system in our report to the UN"
DECISION SUPPORT	"We used the new 2008 data as an extra check on who should get funding"	"Based on the new aggregate it was easier to issue block permits"	"We gave subsidies to utilities that were above the limit in the indictor"	"We did not approve budgets before indicators on all three levels were reported"

Table 15 Hypothetical responses – Negative "Counter examples"

	Value	Variable	Evaluation	Framework
NON RECEPTION	"the 2008 data came too late"	"We could not see the benefit of the new aggregate value for all XXX"	"We did not believe that utility xxx was really the best performer"	"We were not aware of the indictor reports that included all three dimensions"
Reception yes, but… **INTERNAL NON APPLICATION**	"We did not use the indicator data in our internal paper, since we had better data ourselves"	"We liked the new variable but it took too much work to rebuild our database"	"Internally we wanted a more detailed ranking than the indicator supported"	"We found the reports 'balanced scorecard' approach too time consuming for our agency"
Internal yes, but… **EXTERNAL NON APPLICATION**	"We were not allowed by XX to use the indicator results for official communication"	"Some regions would protest if we started reporting based on the new variable"	"It would look unfair if we as an official agency would use these critical rankings in our report"	"We do not think DPSIR system will help clarify our external reporting"
External yes, but… **NON DECISION SUPPORT**	"The data were not strong /new enough to support real decisions"	"The new variable does not discriminate clearly between first and second time offenders"	"Indicators showing non-compliance in 2005 were too old to base permits on them"	"The 'footprint' approach of this report is not reliable enough for anything but general debating"

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